July 2019

Agricultural Education Teachers' Perceptions and Use of Environmental Education in Louisiana Schools

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AGRICULTURAL EDUCATION TEACHERS' PERCEPTIONS AND USE OF ENVIRONMENTAL EDUCATION IN LOUISIANA SCHOOLS

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Science

in

The Department of Agricultural and Extension Education

by
Olivia Maria Soler
B.S., Louisiana State University, 2017
August 2019

ACKNOWLEDGEMENTS

First, I would like to thank my thesis committee for their expertise, support and patience throughout this process. Dr. Blackburn, thank you for pushing me to achieve my best and for helping me make this document the best it could be. Dr. Kaller, thank you for helping me realize my potential and for helping guide me into the education field. Your assistance and encouragement during my undergraduate career have certainly carried over. Lastly, overwhelming thanks to Dr. Stair. You embody all the ideal components of an educator and it has been both a pleasure and a privilege to be your graduate student. Also, thank you for all the tea.

To my mom and sisters, thank you for your guidance and support throughout my life. You constantly inspire me to reach higher and become the best version of myself. When I thought I could not go any further, you pushed me to keep going and provided irreplaceable love and support. I certainly would not be the same without you.

Lastly, I would like to thank the most uplifting individuals to have willingly walk into my life. My dearest friends, Leslie, Colleen, Madie, and Courtney. Your unwavering support and brightness have brought me further in life. Thank you for being there for me when I needed you the most, especially when I was writing this thesis with a broken wrist. I am lucky to call you my friends.

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ACRONYMS

Environmental education (EE)
Best management practices (BMPs)
Louisiana Agriscience Teacher Association (LATA)

ABSTRACT

The purpose of this study was to describe the status of environmental education (EE) in Louisiana high school agriculture classrooms. A census of Louisiana Agriscience Teacher Association (LATA) members was conducted to understand their perceptions, attitudes, and barriers regarding EE implementation. Icek Ajzen's Theory of Planned Behavior was utilized as the theoretical framework. Data were collected through an online survey research method and analyzed using descriptive statistics. Results suggest that most LATA members incorporate EE into their curriculum relatively sparingly, perceive EE to be beneficial for students, and are in need of funding to incorporate EE into their curriculum as well as professional development opportunities. Based on the findings of this study, the researcher provides several recommendations for future research and practice.

CHAPTER 1. INTRODUCTION

Background and Setting

Both children and adults in the United States have demonstrated a lack of understanding regarding environmental topics and issues (Bofferding & Kloser, 2015; Bradley, Waliczek, & Zajicek, 1999; Flannery & Whiting, 2003; Gambro & Switzky, 1999; Robelia & Murphy, 2012; Westervelt & Llewellyn, 1985). Robelia and Murphy (2012) compiled national environmental knowledge survey results between 1997 and 2009 and found that United States citizens have misconceptions regarding environmental issues, which hinders them from making informed environmental policy decisions. Additionally, Westervelt and Llewellyn (1985) conducted a national study of fifth and sixth grade students' wildlife knowledge and attitudes in the United States and discovered that students possessed limited knowledge regarding wildlife and received most of their knowledge from television. A similar study was conducted by Flannery and Whiting (2003) also found that television was the primary source of wildlife knowledge for fifth grade students in Texas. For children who do not have access to EE in school, television programs may serve as a supplemental form of information, but it cannot replace formal education (Flannery & Whiting, 2003; Hungerford & Volk, 1990; Westervelt & Llewellyn, 1985). Where a student lives may also contribute to environmental knowledge. Flannery and Whiting (2003) as well as Westervelt and Llewellyn (1985) found that minority students living in urban areas demonstrated less wildlife knowledge than non-minority students in rural areas. However, Race, Decker and Taylor (1990) found that students living in urban areas had higher wildlife knowledge than students in rural areas. Due to limited opportunities to safely access natural resources, African American and Hispanics from low-income neighborhoods are less inclined than Caucasian people to change their perspective on environmental issues and have

little chance for positive reinforcement of ecological concepts (Bullard, 2006; Fisman, 2005; Jones & Rainey, 2006). Not only do children living in urban cities feel disconnected from nature, but urban issues such as pollution and poverty, which are commonly endured by people of color and immigrants, are often seen as exclusively social issues rather than environmental issues (Blanchet-Cohen & Reilly, 2013). Regardless of demographics, there is a need for expanding formal environmental education (EE) for students.

As future voters, policy makers, and consumers, it is particularly important to educate youth to become informed of environmental topics and develop critical thinking and problem-solving skills (Bofferding & Kloser, 2015; Bradley et al., 1999). The environmental issues occurring today will impact children and youth into their adulthood, meaning they must be prepared to tackle these issues as adults (Naquin, Cole, Bowers, & Walkwitz, 2011). To ensure that students are able to develop the skills necessary to analyze issues and make informed decisions, they should be provided an education that involves developing critical thinking and problem-solving skills while also incorporating environmental content (Stapp et al., 1969). Further, EE educates learners on environmental issues and topics and provides learners with the necessary skills to become informed citizens that are able to make responsible decisions (Athman & Monroe, 2001; Stapp et al., 1969). Therefore, EE is implemented in educational settings in hopes that increasing students' knowledge of environmental issues and topics will lead to environmental literacy, which hopefully leads to changes in behavior (Hungerford & Volk, 1990).

Previous literature regarding the connection between knowledge and action have found equivocal results, with some finding that possessing knowledge does not influence action (Hungerford & Volk, 1990; Paco & Lavrador, 2017; Polonsky, Garma, & Grau, 2011) and others

stating that knowledge does have an impact on action (Bord et al., 1999; Malkus & Meinhold, 2005). Although knowledge alone may not be sufficient to directly influence action, it is a fundamental prerequisite (Robelia & Murphy, 2012). For example, much of environmental policy involves environmental knowledge that is inherently too complex for the general public to grasp (Paco & Lavrador, 2017). Citizens cannot be expected to change their behaviors based on information they are unable to interpret, meaning EE must be readily accessible and understandable if citizens are to become environmentally literate and make informed environmental policy decisions (Disinger, 2001; Paco & Lavrador, 2017). If EE is to be more successful at encouraging changes in action, the instruction can be made relevant to learners (Athman & Monroe, 2001). By including topics that are relevant to learners' sense of place, students may become more impacted by instruction and therefore more influenced to make environmentally responsible decisions (Kudryavtsev, Krasny, & Stedman, 2012). For students in Louisiana, relevant connections to EE may include topics on local agricultural production and land use changes, soil erosion, river leveeing, coastal wetlands, fisheries, and/or forestry.

Louisiana possesses a variety of valuable natural resources and environments. However, much of these have unfortunately faced degradation in the last several decades. Overall, 40% of the contiguous United States' wetlands are located in Louisiana. Further, Louisiana has experienced 80% of the total wetland loss in the country in the last century (Jankowski, Tornqvist, & Fernandes, 2017). While wetlands can be lost through natural processes, most of the loss experienced since 1900 is anthropogenically induced (Jankowski et al., 2017). Wetlands are threatened by human impacts such as river leveeing and damming, dredging navigation canals, water pollution from upstream watersheds, drainage for agriculture and urban development, and peat mining (Jankowski et al., 2017; Mitsch & Hernandez, 2012). Changes in

precipitation patterns directly affect the length and degree of flooding of inland wetlands, which impacts hydrology as well as the flora and fauna of the area (Mitsch & Hernandez, 2012). The combination of these effects makes land loss and rising sea levels a complex issue (Jankowski et al., 2017). Specifically, the sea level is estimated to rise 50 to 200 centimeters within the next century (Mitsch & Hernandez, 2012). Rising sea levels and a lack of equivalent vertical accretion of sediments due to river leveeing will eventually result in the degradation of wetlands in coastal areas (Mitsch & Hernandez, 2012). Coastal wetlands act as a filter between land runoff from agriculture and the ocean, meaning the loss of these areas will result in decreased water quality in open water (Barnes et al., 2015). The consequences of excessive runoff from agriculture upstream have already plagued the Gulf of Mexico by producing a *dead zone* of hypoxic water (Barnes et al., 2015). This area lacks enough oxygen to support living organisms, which directly impacts the functionality and the availability of the resources provided by wetlands and the open ocean (McCrackin, Cooter, Dennis, Harrison, & Compton, 2017).

Coastal and inland wetlands provide a variety of resources and services for both the residents of Louisiana and the nation (Barnes et al., 2015; Jankowski et al., 2017). Wetlands and estuaries in Louisiana provide several valuable ecosystem services, including (a) storm protection, (b) water for consumption and transport, (c) food, (d) raw materials, (e) medicinal and plant resources, (f) nutrient cycling, (g) biological biodiversity, and (h) cultural goods and services such as recreation (Barnes et al., 2015). Rising sea-levels and land loss in Louisiana puts these resources at risk, especially (a) raw materials, (b) water supply resources, (c) medicinal and plant resources, and (d) food from fisheries, hunting, aquaculture, and agriculture (Barnes et al., 2015). Specifically, the aquaculture industry contributes $326 million to the state's economy (Lutz, LeBlanc, Sheffield, & Nix, 2011). Louisiana is also a major contributor for the nation's

seafood, meaning land loss in Louisiana effects the economies of other areas in the nation (Barnes et al., 2015). The degradation of these natural ecosystems also has severe impacts for sport fishing related tourism and job opportunities (Hall & Higham, 2005; Jankowski, 2017). This has serious direct and indirect implications for all demographics of Louisiana.

As of 2016, approximately 63% of Louisiana's population was Caucasian, 32% was African American, and 5% was Hispanic or Latino (U.S. Census Bureau, 2017). When compared to Caucasian children, African American and Hispanic children are twice as likely to live below the poverty line (Macartney, Bishaw, & Fontenot, 2013). According to the United States Census Bureau, about 20% of the state of Louisiana's population is in poverty (U.S. Census Bureau, 2017). In areas like Louisiana that have economies that rely partly on the productivity of natural resources, such as forestry, aquaculture, and oyster production, the loss of these systems results in both environmental and social issues (Schrobback & Coglan, 2018). Losing these industries means losing vital job opportunities and food resources for locals (Schrobback & Coglan, 2018). Additionally, these issues can severely impact the health and quality of life of individuals, including furthering food insecurity and the loss of job opportunities in economies that rely on natural resources (Schrobback & Cogland, 2018). In an effort to maintain a sustainable relationship between the environment, public welfare, and agricultural production, there has been increased interest on educating the public and agricultural producers about these connections (Francis, Jensen, Lieblein, & Breland, 2017; Robertson & Swinton, 2005).

Agricultural practices have a significant effect on global environmental health, including (a) water quality, (b) greenhouse gas emissions, (c) biological diversity, (d) carbon sequestration, and (e) soil erosion (DeLonge, Miles, & Carlisle, 2016). Irresponsible agricultural practices have been linked to the degradation of environmental resources, including (a) soil and water pollution,

(b) fish die-offs, (c) decreased biodiversity, and (d) soil depletion (Horrigan, Lawrence, & Walker, 2002). Modern agriculture has the potential to overly consume fossil fuels, topsoil, and water, which have negative consequences for environmental and public health (Horrigan et al., 2002). These issues are further exacerbated by changes in global climate. While climate variability has always provided a challenge to humans, the consequences of anthropogenically induced climate change in the last several decades puts the livelihoods of humans at risk (Ojha, Pattnaik, & Rout., 2018). The effects of climate change combined with environmentally irresponsible human impacts such as the (a) excessive emission of greenhouse gases, (b) habitat fragmentation, (c) excessive ground water depletion, (d) land use changes, and (e) destructive agricultural practices have resulted in negative consequences on biodiversity and habitat health (DeLonge et al., 2016; Mahmoud & Gan, 2018). These impacts directly influence the health and productivity of ecosystems, many of which both directly and indirectly effect local economies and food security, especially in rural communities (Ojha et al., 2018; Schrobback & Coglan, 2018).

It should be noted that not all agricultural practices have the same impact. To minimize the negative impacts of agricultural production on environmental systems, the United States has enacted policies at the federal and state levels to encourage producers to adopt sustainable best management practices (BMPs), which are voluntary practices established through years of scientific research to maintain efficiency, minimize environmental impacts, and conserve resources (Paudel, Gauthier, Westra, & Hall, 2008; Sheffield, LeBlanc, Moreira, & Twidwell, 2010). One of the most influential legislative acts regarding minimizing pollution is the Federal Water Pollution Control Act (FWPCA) of 2002, which was enacted to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters” (p. 3). Specifically, this

legislation calls for each state to prevent and eliminate pollution from entering waterways (The Federal Water Pollution Control Act, 2002). Under this legislation, the Environmental Protection Agency (EPA) enforces the management of point and nonpoint sources of pollution, including those sources related to agricultural production. At the state level, the Louisiana State University (LSU) AgCenter has developed voluntary BMPs for all aspects of agricultural production as a way to manage pollution. BMPs for protecting waterways focus on five central areas: (a) pesticide management, (b) pasture management, (c) soil and water management, (d) nutrient management, and (e) general farm BMPs (Sanders, 2001). To minimize pollutants and excess nutrients from entering waterways, agricultural producers can use these voluntary guidelines to modify practices. For example, farmers may plant additional vegetative filter strips to act as a natural filter between crops and waterways (Sanders, 2001). Additional modifications include (a) prohibiting livestock from accessing streams and streambanks, (b) planting cover crops between crop cycles, (c) conservation tillage, and (d) ensuring regular inspections of storage facilities (Sanders, 2001). While each of the specific agricultural industries (i.e. aquaculture, agronomic crops, forestry, livestock) have their own specific set of guidelines, they ultimately aim to incorporate practical and cost-effective strategies in order to reduce pollution, conserve water, soil, and nutrients, and minimize environmental degradation. However, some of these modifications can be costly and agricultural producers are not legally required to adopt these practices (Paudel et al., 2008).

The Natural Resource Conservation Service (NRCS) provides incentives to producers who are interested in implementing BMPs through the Environmental Quality Incentive Program (EQIP) (Paudel et al., 2008). Qualifying farmers may receive financial compensation through limited incentive payments or financial assistance to construct structural BMPs (Paudel et al.,

2008). Despite the incentives, many farmers are reluctant to implement BMPs because of dedication of time and resources required for implementation (Riar et al., 2013). A study conducted by Riar et al. (2013) found that farmers in the southern United States, including Louisiana, were only willing to adopt herbicide BMPs that resulted in immediate, high-yielding results. This may reflect a lack of knowledge regarding the long-term benefits of enacting BMPs (Riar et al., 2013). The adoption of these practices will provide long term benefits for conserving natural resources and maintaining agricultural productivity, which ultimately benefits the producers and the public (Riar et al., 2013). Improving the relationship between agricultural production and the natural environment will require policy innovation from sound ecological and socioeconomic research, an increase in public education, and further incentivizing agricultural producers to adopt BMPs (Robertson & Swinton, 2005). The LSU AgCenter works alongside state agencies to encourage agricultural producers to continue to adopt BMPs through educational outreach and the distribution of educational materials (Sanders, 2001).

In the last few decades, there has been an increased focus on providing environmental education coursework for both citizens and for agricultural producers and farmers (Francis, Jensen, Lieblein, & Breland, 2017; Robertson & Swinton, 2005). According to a report published by the North American Association for Environmental Education (NAEEE), Louisiana has completed the plan drafting stage but has not yet fully adopted EE into the K-12 curriculum (Braus, Cottle, Li, McGlauflin, Merrick, & Price, 2014). Louisiana's susceptibility to climate change and ecosystem degradation enhances its need for citizens that are environmentally literate. This study aimed to determine the status of EE in Louisiana high schools, which will aid in ensuring that all Louisiana residents have equal access to effective EE.

Statement of the problem

Despite the growing concern of the implications of environmental degradation, EE remains absent in many classrooms throughout the United States (Braus et al., 2014). Both youth and adults have misconceptions of environmental issues (Blumstein & Saylan, 2007; Bofferding & Kloser, 2015; Bradley et al., 1999; Gambro & Switzky, 1999). EE addresses this problem by producing citizens that can think critically about environmental issues, are environmentally literate, and therefore will hopefully be motivated to make informed policy decisions (Stapp et al., 1969).

Environmental issues are intrinsically intertwined with agriculture. Public health and the health of the natural environment are largely impacted by various factors within agricultural practices (Haney & Field, 1991). Irresponsible modern agricultural practices have been linked to the degradation of environmental resources, including (a) soil and water pollution, (b) fish die-offs, (c) decreased biodiversity, and (d) soil depletion (Horrigan, Lawrence, & Walker, 2002). Agriculture has the potential to overly consume fossil fuels, topsoil, and water, which have negative consequences for environmental and public health (Horrigan et al., 2002). Because of these concerns, there has been increased demand for education on sustainable agricultural practices and requirements for more producers to adopt these practices (Carlisle, 2016; Robertson & Swinton, 2005; Tilman et al., 2002). Adopting responsible agricultural practices not only minimizes the environmental impact of production agriculture but provides economic incentives for the farmers that utilize those methods (Carlisle, 2016). The United States has the ability to advance agricultural practices to feed and clothe its growing population, but it must do so without concurrently destroying natural resources and ecosystems (Haney & Field, 1991). When properly managed, agriculture has the potential to provide numerous ecosystem services

for humans beyond production, including (a) pollination, (b) clean water and air, (c) carbon storage, and (d) habitat for various organisms, including beneficial insects and songbirds (Carlisle, 2016; Robertson & Swinton, 2005). EE provides an opportunity for agriculture teachers to incorporate environmental topics into their agriculture curriculum. This has potential to educate their students on sustainable agricultural methods and responsible consumer decisions. As Louisiana residents, the topics of agriculture and sustainability are especially relevant.

Since Louisiana is particularly susceptible to both naturally and anthropogenically induced environmental issues, providing EE to residents is essential. It is imperative that all individuals are provided with equal opportunities to further their education and develop the necessary skills to become informed citizens. Further, Figland et al. (2018) conducted a study with Louisiana agriculture teachers which identified classroom-based professional development needs. When asked what type of technical agriculture professional development they needed the most, most teachers stated that they needed more environmental and natural resource development (Figland et al., 2018). Providing more environmental and natural resource development opportunities for agriculture teachers may further the inclusion of EE in high school classrooms. Professional development of agriculture teachers in Louisiana has traditionally been conducted through the Louisiana Agriscience Teachers Association (LATA). This professional organization is specifically for agriculture teachers in Louisiana and provides opportunities for members to participate in professional development activities. This organization also actively disseminates information to members regarding formal instruction and new developments within agriculture.

Louisiana has shown a trend in developing EE, which involves developing comprehensive EE programs at the state and local levels (Ruskey, Wilke, & Beasley, 2001).

However, there is still more development left to be done. Understanding which geographic areas of Louisiana are lacking in EE and identifying their perceived barriers may assist legislators and administrators in implementing EE further. This study aims to provide a description of agriculture teachers' perceptions of EE and where and how it is being implemented in Louisiana high school classrooms.

Purpose of the study

The purpose of this exploratory study is to discover the extent in which EE is being implemented in high school agriculture classrooms in Louisiana. More specifically, this study will aim to identify the level of EE incorporated by Louisiana high school agriculture teachers who are members of the Louisiana Agriscience Teachers Association (LATA) by examining their perceptions of EE, perceived benefits of EE, resources they have access to, and any perceived barriers to implementation. With this in mind, understanding the status of EE in Louisiana, teachers' perceptions, and the barriers to implementation will allow a more seamless incorporation of EE into teachers' classrooms.

Research Questions

1. To what extent do LATA members in Louisiana high schools incorporate environmental education (EE) into their curriculum?
2. What factors prohibit Louisiana high school LATA members from implementing EE?
3. To what extent do Louisiana high school LATA members who do not implement EE intend on incorporating EE into their curriculum?
4. What do Louisiana high school LATA members who incorporate EE perceive to be barriers to implementing EE?
5. What are Louisiana high school LATA members' perceived benefits of EE?

6. What resources are available to assist Louisiana high school LATA members in implementing EE?
7. For Louisiana high school LATA members who do implement EE, what was their strongest influence to include EE into their curriculum?

Definition of Terms

For the purpose of this study, environmental education (EE) refers to education that is aimed at educating students on the biophysical environment and its associated issues, how to help solve these problems, and to motivate them to work toward environmental solutions. EE is multidisciplinary, meaning it can involve numerous topics involving the environment, including but not limited to agriculture, forestry, fisheries, wildlife, environmental science, geography, natural resources, horticulture, and chemistry. While it is multidisciplinary, EE is education specifically in, about, and for the environment. It ultimately emphasizes environmental literacy, which is defined as "the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems" (Disinger, 2001, p. 9).

Limitations of the Study

This census study consisted of Louisiana Agriscience Teacher Association (LATA) members through an online survey distributed via email, so the largest limitation was access to teachers and their willingness to participate in the study. The scope of this study was limited to the teachers who chose to participate in the survey. Because only teachers who were members of LATA were included in this study, generalizability was limited only to teachers who are LATA members.

This study was initially intended to reach both high school agriculture and science teachers in Louisiana. However, the researchers encountered numerous obstacles while attempting to reach the high school science teacher population in Louisiana. Various attempts were made, including calling stratified randomly selected schools for access to science teachers and attending a conference for science teachers in Louisiana. These attempts were unsuccessful and resulted in the researchers removing science teachers from the study entirely.

Basic Assumptions

This study asked individuals to self-report on their experiences, so it is assumed that the teachers will accurately and honestly answer questions. Since the study concerns environmental education, it is assumed that the teachers are familiar with the concept and can accurately report on it.

Significance of the Problem

This study aimed to determine where EE is being provided in high schools by LATA members in Louisiana. Along with various science courses, one of the most appropriate subjects to cover EE is within agriculture coursework due to the nature of the material covered in instruction. Further, the barriers to EE implementation were explored. By doing this, this study may help to identify EE availability in Louisiana and assist in efforts to make improvements where needed.

If agricultural science teachers are to incorporate EE into their class curriculum, they need to overcome many obstacles. One of the largest barriers reported in the literature is a lack of professional development regarding environmental concepts and pedagogy (Crim, Moseley, & Desjean-Perrotta, 2017; McDonald & Dominguez, 2010; Paul & Volk, 2002). In a 2018 study, Louisiana agriculture teachers were asked to describe their professional development needs and

expressed a need for environmental and natural resource training (Figland, Blackburn, Smith, & Stair, 2018). If teachers are to effectively incorporate EE into their curriculum, they must have the proper training in both environmental topics and pedagogy. This study aimed to add to the scientific literature regarding EE in Louisiana by explaining LATA members perceptions and barriers to EE.

CHAPTER 2. REVIEW OF THE LITERATURE

Theoretical Framework

Environmental education aims to increase environmental literacy, which ultimately encourages changes in human behavior (Hungerford & Volk, 1990). These behavior changes range from learning new skills to responsible citizenship (Hungerford & Volk, 1990). Ajzen's (1991) Theory of Planned Behavior (TPB) was employed as the theoretical framework for this study. TPB is a revised extension of the Theory of Reasoned Action (Ajzen, 1991; Fishbein, 1979). The Theory of Reasoned Action was developed without discussing complete volitional control, which entails a unique set of limitations for individuals (Ajzen, 1991). An individual lacks complete volitional control when carrying out a particular goal requires action from that individual as well as from outside factors (Ajzen, 1991). If an individual has the intention of completing a task but is unable to because of factors outside of their control, they lack volitional control (Ajzen, 1991). TPB takes individual's intentions to perform given behaviors, volitional control, attitudes, and subjective norms into consideration (Ajzen, 1991).

According to Ajzen's (1991) theory, human behavior is guided by three considerations: (a) beliefs about the likely consequences or other attributes of the behavior, (b) beliefs about the normative expectations of other people, and (c) beliefs about the presence of factors that may further or hinder performance of the behavior (see Figure 1) (Ajzen, 2002, p. 665).

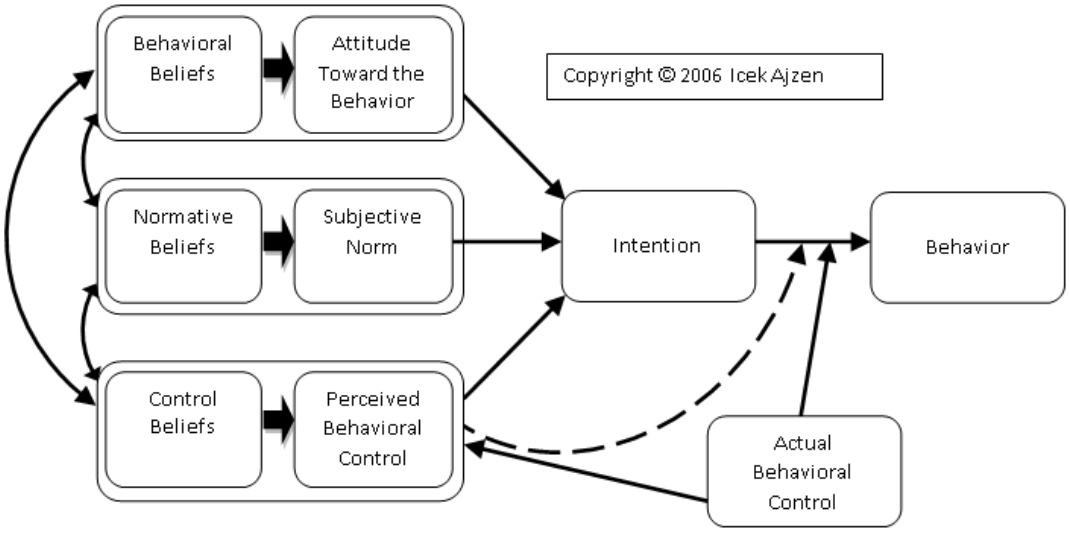


Figure 1. Illustration of the Theory of planned behavior (Adapted from Ajzen, 2006, p. 1, Copyright © Icek Ajzen).

Essentially, behavioral beliefs produce either a positive or negative attitude toward the behavior, normative beliefs result in a social pressure or subjective norm, and control beliefs result in a perceived ease or difficulty of performing that behavior (Ajzen, 2002). These three conceptions form a behavioral intention (Ajzen, 2002). An individual is expected to carry out his or her intentions if they believe they have actual control over the behavior (Ajzen, 2002). When individuals believe that they have the necessary resources and opportunities and are not impeded by obstacles, they should have confidence in their ability to perform a specific behavior (Ajzen, 2002). The connection between these attributes can be seen in Figure 1. According to this theory, "perceived behavioral control, together with behavioral intention, can be used directly to predict behavioral achievement" (Ajzen, 1991, p. 184).

As per TPB, if agriculture teachers are provided with the proper professional development, are knowledgeable on environmental topics and pedagogy, believe that EE is beneficial for their students, and are not impeded by obstacles such as a lack of funding, time, or administrative support, they will have the intention to incorporate EE into their curriculum. If agriculture teachers have the adequate resources and knowledge, they should have the

confidence to carry out their intentions to implement EE into their classrooms. Understanding the perceptions of teachers, what resources are available to them, which barriers they face, and the normative expectations of those around them will assist in furthering the implementation of EE into classrooms.

Previous research indicates conflicting teacher perceptions of EE, with some perceiving it to be beneficial to their students (Kim & Fortner, 2006; Pedretti & Nazir, 2014; Powers, 2004) and others viewing it negatively (Athman & Monroe, 2001). Despite teachers' perceptions, there are numerous barriers that can inhibit teachers' ability to implement EE into their curriculum (Braus et al., 2014; Cherif, 1992; Ernst, 2009; Kim & Fortner, 2006; McDonald & Dominguez, 2010; Paul & Volk, 2002; Powers, 2004). However, research suggests that teachers who consider EE to be beneficial to their curriculum and receive support from administration are not impeded by strong obstacles (Pedretti & Nazir, 2014). In Louisiana, agriculture teachers have stated that they need more professional development regarding environmental topics and pedagogy (Figland et al., 2018). However, there is no scientific literature regarding Louisiana teachers' perceptions of and barriers to implementing EE in the classroom. This study aimed to understand the conditions and perceptions of agriculture teachers in Louisiana in regards to EE and Azjen's (1991) TPB. This information will add to the scientific body of knowledge regarding EE implementation and aid in providing a better understanding of EE in Louisiana high schools.

Definition and Goals of Environmental Education

Environmental education (EE) is difficult to define because it is interdisciplinary and has evolved greatly since it was originally introduced (Ardoin, Bowers, Roth, & Holthuis, 2018; McDonald & Dominguez, 2010). In its most simple form, EE can be defined as education in, about, and for the environment (Monroe, Andrews, & Biedenweg, 2007). However, due to its

interdisciplinary approach, this definition may not be quite enough to encompass the possible reach of EE. The first formal definition was developed by William Stapp in 1969: "Environmental education is aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution" (pp. 31-32). This definition is similar to others that have been developed since, but it is one of the most commonly cited and generally employed by practitioners (Disinger, 2001). Stapp et al. (1969) argued that effective EE will foster these objectives in learners:

1. A clear understanding that man is an inseparable part of a system, consisting of man, culture, and the biophysical environment, and that man has the ability to alter the interrelationships of this system.
2. A broad understanding of the biophysical environment, both natural, and man-made, and its role in contemporary society.
3. A fundamental understanding of the biophysical environmental problems confronting man, how these problems can be solved, and the responsibility of citizens and government to work toward their solution.
4. Attitudes of concern for the quality of the biophysical environment which will motivate citizens to participate in biophysical environmental problem-solving (Stapp et al., 1969, pp. 34-35.)

According to the Belgrade Charter, the primary goal of EE is to develop a world citizenry that has the "knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (Archie, 2010,

p. 1). This goal was expanded upon with the Tbilisi Declaration in 1978 (Archie, 2010). They developed three main goals for EE:

1. To foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas
2. To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment
3. To create new patterns of behavior of individuals, groups and society as a whole towards the environment (Archie, 2010, pp. 1-2)

EE essentially aims to enhance environmental literacy among citizens (Disinger, 2001; Erdogan et al., 2012; Monroe et al., 2008; Stapp et al., 1969; Stern, Powell, & Hill, 2014). This literacy can be defined as "the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems" (Disinger, 2001, p. 9). An environmentally literate individual can (a) critically evaluate environmental issues, (b) understand how to tackle those issues, and (c) will make informed decisions to improve the well-being of their community, societies, and the global environment (Crim et al., 2017). This requires both knowledge in environmental topics and a foundation in critical thinking and problem solving. If EE is to promote environmental literacy and achieve the previously mentioned goals, it requires more than simple repetition of facts. EE is multidisciplinary, multifaceted, and often community based (Ardoin et al., 2018; Athman & Monroe, 2001; Blanchet-Cohen & Reilly, 2013; Littledyke, 1997; McDonald & Dominguez, 2010; Monroe et al., 2008; Stapp et al., 1969). Effective EE will be (a) science and evidence based, (b) incorporate multiple perspectives, (c) relevant to its audience, (d) empower learners with critical thinking and problem-solving skills to prevent and address environmental issues,

and (e) foster learners with a sense of personal and civic responsibility (Athman & Monroe, 2001; Ernst, 2007; Paul & Volk, 2002).

History of Environmental Education

EE has a varied history that has early influences in the 1700s in the United States (Athman & Monroe, 2001; Carter & Simmons, 2010; Hungerford, 2010; McCrea, 2006). The concept of learning about the environment predates the term environmental education. In the 1700s, philosophers such as Jean-Jacques Rousseau argued that education should have a focus on the environment (McCrea, 2006). Originally, EE focused on nature study and outdoor education and has evolved over time to encompass a variety of disciplines (Hungerford, 2010). The original concept of nature study began with Wilbur Jackman's book, *Nature Study for the Common Schools* in 1891 (Athman & Monroe, 2001; McCrea, 2006). This movement was encouraged further by renowned leaders such as John Muir, whose studies of the natural world encouraged others (Athman & Monroe, 2001). In 1908, nature study was developed by the establishment of the American Nature Study Society (McCrea, 2006). However, in the 1930s the conversation shifted from nature study to conservation after the Dust Bowl in the United States (Athman & Monroe, 2001; McCrea, 2006).

The Dust Bowl was a decade long drought in the 1930s in the North American Great Plains that was exacerbated by poor farming and ranching management practices (Athman & Monroe, 2001; Carter & Simmons, 2010; McCrea, 2006; McLeman et al., 2014). Prior to this era, the land consisted of mixed prairie grasses, which was quickly converted to farmland after agricultural settlement (McLeman et al, 2014). The unintentional mismanagement of the landscape by farmers of this time resulted in overwhelming amounts of soil erosion. The loose soil was lifted by the strong winds of the southern plains and created dust storms, which went

over state lines and clouded streets (McLeman et al., 2014). The severity of the situation resulted in a call for conservation education and policy reform, including the Soil Conservation Service of 1935 (Carter & Simmons, 2010). In the same year, The National Education Association began its efforts to make conservation education available in schools (McCrea, 2006). Simultaneously during this era, the forester Aldo Leopold began influencing the importance of conservation and the environment with his writing and theories (Athman & Monroe, 2001). The work of Leopold accompanied by the research of more progressive educational practices by the philosopher John Dewey in the 1930s brought more attention to conservation education (McDonald & Dominguez, 2010). The following decades gave rise to numerous legislative movements (see Table 2.1).

Table 2.1. Legislative movements regarding environmental health and education in the United States between 1953 and 1970

Date	Legislation	Goals
1953	Conservation Education Association	Formed to support the educators working in the conservation education field
1955	Clean Air Act	First federal legislation enacted to control air pollution
1964	Wilderness Act	Preserve wild lands in their natural conditions to secure them for present and future generations
1965	Water Quality Act	Directed states to establish water quality standards to protect surface and ground water
1965	Solid Waste Disposal Act	Promote the protection of the environment and conserve material and energy resources by promoting environmentally safe solid waste management techniques
1966	Endangered Species Preservation Act	Allowed native animal species to be listed as endangered and providing limited protection; starting point for the Endangered Species Act of 1973
1968	Wild and Scenic River Act	Preserve and protect certain rivers while recognizing their value for appropriate use and development
1969	National Environmental Policy Act	Establish policy that will prevent damage to the environment while encouraging harmony between man and ecological systems and natural resources
1970	National Environmental Education Act of 1970	Created an U.S. Office of Environmental Education in the Department of Health, Education, and Welfare, a National Advisory Council for EE, and a grants program; eliminated in 1981

The increase in legislation possibly reflected the public's growing concern over the health of the environment and its effects on human health (Carter & Simmons, 2010). This was in part

fueled by the renowned book, *Silent Spring* written by Rachel Carson and published in 1962 (Athman & Monroe, 2001; Carter & Simmons, 2010; Lear, 1993). Rachel Carson, a marine biologist and writer, wrote *Silent Spring* in hopes of educating the public on the misuse of pesticides in the United States (Lear, 1993). Her book focused specifically dichlorodiphenyltrichloroethane (DDT), an insecticide that is extremely effective in preventing malaria by controlling mosquito populations (Turusov, Rakitsky, & Tomatis, 2002). However, this insecticide is harmful to wildlife populations and is persistent within the environment, meaning it remains in the tissues of organisms and water systems even years after it is introduced (Turusov et al., 2002). Its overly intensive use resulted in widespread pollution, with adverse effects to freshwater and marine organisms, birds, and mammals (Turusov et al., 2002). By documenting and publishing her work, Carson (1962) brought public attention to the consequences of toxic pesticides and insecticides like DDT, including the near extinction of several species of birds and contaminated water supplies (Lear, 1993; Travis, 2012). By writing her book in terms that the public could understand, she brought a form of EE to the general population and helped instill the notion that humans have a direct impact on the natural environment (Travis, 2012). Her work indirectly supported the development of EE by informing the public on scientific and environmental concerns. This momentum continued into later decades with more legislative actions. In 1969, the National Environmental Policy Act (NEPA) was established to "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation" (42 U.S.C. § 4321, p. 1). This combined with future legislation marked a prominent shift for the status of EE.

Due to the preceding legislative actions, the focus of EE shifted from nature study and conservation to a focus in biodiversity education, sustainable development, and climate change education (Hungerford, 2010). The 1970s proved to be a major turning point for EE both domestically and internationally. In 1970, the National Environmental Education Act was enacted in the United States (Carter & Simmons, 2010; McCrea, 2006; Sullivan Jr. & Schlesinger, 1972). This act brought the establishment of an Office of Environmental Education within the U.S. Office of Education and funding for states to begin implementing EE within their K-12 school systems (Carter & Simmons, 2010). While this act had shortcomings, including a lifespan of only five years, it marked a transition of EE by being the first federal doctrine enforcing EE in the nation (Carter & Simmons, 2010). Unfortunately, the Office of Environmental Education was later eliminated in 1981 (McCrea, 2006).

The first Earth Day was also established in 1970, which may represent the start of the public recognizing that humans have a direct effect on the environment (Athman & Monroe, 2001; Carter & Simmons, 2010; Jansen, 1995; McCrea, 2006). The following year, the North American Association for Environmental Education (NAAEE) was developed to promote professional development for environmental educators (Carter & Simmons, 2010). In 1972 in Stockholm, Sweden, the United Nations Conference on the Human Environment was held and called for environmental education to tackle environmental issues (Athman & Monroe, 2001; McCrea, 2006). This conference was built upon years later at the International Workshop on Environmental Education, which was held in Belgrade, Yugoslavia in 1975 (Carter & Simmons, 2010; McCrea, 2006). Now commonly known as The Belgrade Charter, this conference described the basic goals, objectives, audiences, and foundational principles of EE (Blatt, 2015; Carter & Simmons, 2010; McCrea, 2006). These two conferences helped clear the ambiguity of

defining EE, but the first Intergovernmental Conference on Environmental Education is considered to be the most important conference regarding defining EE (Carter & Simmons, 2010). This conference was held in Tbilisi, Georgia, USSR in 1977 and developed The Tbilisi Declaration, which provided a focus for EE and a distinct definition for its practice (Aikens, McKenzie, & Vaughter, 2016; Athman & Monroe, 2001; Carter & Simmons, 2010).

Following the Tbilisi Declaration, the United States continued to make efforts towards expanding EE. The National Leadership Conference of Environmental Education was held in Washington D.C. in 1978 and produced the report *From Ought to Action in Environmental Education* by William Stapp (McCrea, 2006; Stapp, 1978). This conference aimed to review recommendations from past EE conferences and develop clear recommendations for the future of EE in the United States, including both federal and state legislation (Stapp, 1978). The momentum from previous years began to slow for legislation in the United States, but there was development for teachers' training materials for EE. In 1983, the Western Association of Fish and Wildlife agencies and the former Western Regional Environmental Education Council, now called the Council for Environmental Education, developed Project WILD (McCrea, 2006). This organization provides preservice teachers with training in EE, sponsors conservation and EE programs in grades K-12 with a focus on wildlife and habitat (McCrea, 2006; Nelson, 2010) This initiative was accompanied by Project WET (Water Education for Teachers) in 1990, which promotes knowledge and stewardship of water resources for students in grades K-12 by providing resources for educators (D'Agostino, Schwartz, Cimetta, & Welsh, 2007; McCrea, 2006). In the same year Project WET was developed for teachers, U.S. Congress passed the National Environmental Education Act of 1990 (McCrea, 2006). This legislation authorized EE grants, student fellowships, an Office of Environmental Education in the U.S. Environmental

Protection Agency, The National Environmental Education and Training Foundation (NEETF), and the President's Environmental Youth Awards (McCrea, 2006). The following years continued to produce valuable EE related conferences and projects that helped further the advancement of EE in the United States.

Currently, the North American Association for Environmental Education (NAAEE) is supporting initiatives to increase environmental literacy in each state by implementing environmental education into the state curriculums (Braus et al., 2014). The environmental literacy plans are "state-specific frameworks that support school systems in expanding and improving EE programs" (Braus et al., 2014, p. 4). These plans are a component of the No Child Left Inside (NCLI) initiative, which was launched in 2007 in order to advance the implementation of EE in United States' schools (Braus et al., 2014; Larson, Castleberry, & Green, 2010). The No Child Left Inside Act was introduced in 2015 and amended the Elementary and Secondary Education Act of 1965 but was passed (S. 492, 2015). This act would allow for states to award grants to eligible partnerships to increase environmental literacy through the furthering of EE programming and teaching training (S. 492, 2015). According to a status report conducted by NAAEE in 2014, only four states in the United States, including California, Arizona, Montana, and North Dakota, have not yet incorporated environmental literacy plans into their K-12 curriculum (Braus et al., 2014). About half of the states in the United States have reported that they have timelines for implementing environmental literacy plans but are hopeful for the passage of the NCLI Act (Braus et al., 2014). Seventy-four percent of states stated that they have received support from their state's Department of Education or Department of Public Instruction, eighty percent stated that NAAEE is used a resource for implementation (Braus et al., 2014). Thirteen states have fully adopted and begun

implementation, but the state of Louisiana is not included (Braus et al., 2014). According to the report, Louisiana has completed the plan drafting stage but has not yet fully adopted EE into the K-12 curriculum (Braus et al., 2014).

Benefits of Environmental Education

EE provides numerous academic benefits for learners. One commonly reported outcome from EE programs is an increase in environmental knowledge (Stern et al., 2014; Volk & Cheak, 2008). Stern, Powell, and Hill (2014) conducted a literature review to determine reported outcomes of EE programs for youth under the age of 18. They searched for numerous outcomes, including (a) knowledge, (b) awareness, (c) skills, (d) attitudes, (e) intentions, (f) behavior, and (g) enjoyment (Stern et al., 2014). Of these outcomes, positive increases in knowledge and attitudes were the most commonly reported (Stern et al., 2014). Aside from simply gaining environmental knowledge, there is a growing amount of literature that supports the notion that EE has numerous positive outcomes for students including improved (a) reading, math, and science skills, (b) critical thinking, (c) motivation, and (d) leadership skills (Ernst, 2007). Volk and Cheak (2008) evaluated an EE program for fifth and sixth grade students in the community of Molokai, Hawaii. They found that when compared to students who did not participate in the program, participating students had more accurate environmental knowledge, scored higher on an environmental literacy test, had more confidence in their ability to make a difference for the environment, had improved oral communication, writing and reading skills, increased experience in using a variety of technologies, and a heightened sense of community (Volk & Cheak, 2008). A report conducted by the State Education and Environment Roundtable in San Diego, California evaluated EE programs across 12 states in the United States in 1997 (Athman & Monroe, 2001). They found that the EE programs increased students' knowledge in multiple

areas, including (a) natural sciences, (b) language arts, (c) mathematics, and (d) social sciences. They also found that over 75% of participating schools saw increases in standardized test scores and grade averages (Athman & Monroe, 2001). These findings are further supported by another study conducted by Ernst and Monroe (2006) that argued when comparing EE and traditional educational methods, students involved in EE learn more effectively, have reduced classroom management issues, have increased enthusiasm for learning, and have improved performance on standardized academic achievement measures. These findings support the notion that EE improves overall student achievement, which is highly beneficial for both learners and educators.

EE provides students with an opportunity to advance critical thinking skills and effective encourages students to synthesize knowledge and skills from multiple disciplines to process and solve problems and make decisions that lead to responsible actions (Ernst & Monroe, 2006). Critical thinking is widely accepted among educational practitioners as an important skill, but can be defined many ways (Blatt, 2015; Ernst & Monroe, 2006; Moore, 2013). Critical thinking has been defined as "reasonable, reflective thinking that is focused on deciding what to believe or do" (Moore, 2013, p. 507), while others have gone into more depth, stating that critical thinking has multiple components (Blatt, 2015; Moore, 2013). Paul and Elder (2001) argue that critical thinking relies on evidence and logic, requires being aware of one's biases or knowledge limitations, acting consistently with one's beliefs, and being able to take others' viewpoints and beliefs into consideration. Ultimately, critical thinking allows individuals to evaluate situations from multiple viewpoints and make unbiased considerations before coming to a conclusion. Critical thinking is a vital component of environmental literacy, for it allows individuals to properly analyze issues as a part of the decision process (Ernst & Monroe, 2006; Volk & Cheak, 2008). A study conducted by Ernst and Monroe (2006) analyzed critical thinking skills of ninth

and twelfth grade students who participated in EE in Florida high schools in the United States. The results of the study support the notion that students who participate in EE programs have better critical thinking skills than their peers who do not participate in EE (Ernst & Monroe, 2006).

Aside from academic achievement, EE provides other beneficial outcomes for those who participate. A study conducted by Szczytko, Carrier, and Stevenson (2018) found that EE conducted in an outdoor setting assisted fifth grade students with emotional, cognitive, and behavioral disabilities. Science teachers from this study stated that students not only maintained their science efficacy and grades but had reduced disruptive behaviors and improved attention spans (Szczytko et al., 2018). EE also helps learners develop a sense of empowerment and personal responsibility (Athman & Monroe, 2001). With the ability to think critically, learners have the opportunity to "make their own decisions and think more critically about their choices" and learn that what they do can make a difference (Athman & Monroe, 2001). Additionally, when used in a local context, EE can foster an emotional connection in learners (Athman & Monroe, 2001; Blatt, 2015; Stern et al., 2014). For example, students in Louisiana may find that learning about American alligator population conservation is more relevant than learning about species conservation from other regions. These affiliations allow for learners to expand on these concepts in larger systems and connections (Athman & Monroe, 2001). By promoting reflection, it allows learners to recognize that they are connected to these systems (Stern et al., 2014).

For minority and disadvantaged students living in urban areas, EE can be especially beneficial (Blanchet-Cohen & Reilly, 2013; Ceaser, 2012). Children who live in urban areas often feel disconnected from nature and EE programs can help alleviate this sense of isolation (Blanchet-Cohen & Reilly, 2013; Ceaser, 2012; White, Eberstein, & Scott, 2018). Previous

studies have suggested youth that are pervasively disconnected from nature are in danger of a weakened physical, social, and psychological well-being (Larson et al., 2010; White et al., 2018). Additionally, individuals in disadvantaged living conditions are typically unable to stop or prevent environmental destruction in their community (Ceaser, 2012). Because of conditions such as low living wages and limited access to resources, they are unable to recover from environmental disasters (Ceaser, 2012). EE programs in these areas allow students to gain more environmental knowledge and awareness, build their critical thinking and reflection skills, and can enable students to feel more enlightened and empowered to create change within their own lives and in their community (Ceaser, 2012; White et al., 2018). Both the academic and non-academic goals of EE foster a sense of community within learners, which helps build a sense of empowerment (Blanchet-Cohen & Reilly, 2013). By participating in activities such as urban gardening, students are able to feel a sense of community while providing low-cost, healthy food for themselves and their community (Ceaser, 2012). Other activities such as bird watching, feeding, and identification develop a positive learning experience while connecting students to nature (White et al., 2018). According to the literature, properly implemented EE is beneficial to learners across several disciplines. Students are able to improve their academic achievement and develop environmental literacy, which improves their ability to make responsible and informed decisions in their everyday life outside of school.

Barriers to Implementing Environmental Education

There are numerous barriers reported in the literature that prevent the implementation of EE into a school's curriculum. The most common barriers reported by teachers include (a) emphasis on state testing, (b) lack of funding, (c) lack of planning time, (d) emphasis on state standards, and (e) lack of transportation (Cherif, 1992; Ernst, 2007; Ernst, 2012; McDonald &

Dominguez, 2010; Kim & Fortner, 2006), limited time and resources for field trips and outdoor activities and cuts to education funding in general (Braus et al., 2014; Ernst, 2009; McDonald & Dominguez, 2010). State-mandated testing often results in drawbacks such as narrowing the curriculum and instruction, loss of instructional time due to test preparation, fostering a sense of powerlessness in teachers, and invalidity over the tests accurately measuring what is being taught and learned (Cimbricz, 2002). Because of this, teachers are often reluctant to incorporate innovative teaching strategies and creative learning activities into their lesson plans (Cimbricz, 2002). Due to the passing of the No Child Left Behind Act in 2002, there is a greater emphasis on state standards (Braus et al., 2014; Ernst, 2009). Teachers are limited in the amount of time they can spend on EE and science because they are required to focus on state testing standards for math and language arts (Braus et al., 2014; Ernst, 2009). This results in limited opportunities for teachers to include EE into their lesson plans due to these conflicts, which are often exacerbated by administrators who must enforce these standards. This lack of administrative support is another commonly reported barrier (Blanchet-Cohen, 2013; Ernst, 2012). This is a significant obstacle because without administrative support, educators are unable to incorporate EE into their curriculum, even if all other barriers are eliminated.

Other barriers, including a lack of teacher training, professional development opportunities for teachers, and a lack of teachers' confidence in teaching environmental topics have also been reported (Braus et al., 2014; Cherif, 1992; Ernst, 2009; Kim & Fortner, 2006; McDonald & Dominguez, 2010; Paul & Volk, 2002; Powers, 2004). Classroom teachers are a major influence in students' perception regarding their relationship to the environment and in developing their environmental literacy (Crim et al., 2017). However, there have been several studies previously conducted that demonstrate that many teachers are not knowledgeable on

environmental topics (Crim et al., 2017; Ernst, 2007; Powers, 2004). Therefore, there is a need for proper educator preparation programs (EPPs) that include EE curricula and appropriate teaching strategies (Crim et al., 2017; McDonald & Dominguez, 2010; Paul & Volk, 2002). Disinger and Howe (1990) stated that "teacher education programs in environmental education remain relatively scarce and poorly developed" (Disinger & Howe, 1990; McKeown-Ice, 2000). Crim, Moseley, and Desjean-Perrotta (2017) analyzed EE within educator preparation programs in the United States and found that less than 15% of respondents indicated that their states offer a form of teacher licensure in EE or require teachers to take a specific course in EE. They also found that the largest barrier to including EE in educator preparation programs is a lack of course time and funding (Crim et al., 2017). However, the strongest supporting factor was collaboration between teacher education departments and informal education sites that incorporate EE (Crim et al., 2017). The need for collaboration supports the previously discussed notion that administrative support is a significant barrier to integrating EE. The respondents for this study indicated that the EPPs they participated in were not at all effective in "conveying environmental action strategies related to EE" but were very effective in "identifying local resources for EE" (Crim et al., 2017). While there are numerous resources available, such as Project WET, Project WILD, Project Learning Tree, and other sources available through the NAAEE and the Environmental Protection Agency (EPA), it is not enough (McDonald & Dominguez, 2010; Paul & Volk, 2002). Pedagogy, environmental concepts and content must be purposefully integrated within teacher preparation programs (McDonald & Dominguez, 2010).

McKeown-Ice (2000) also found limited course time availability was the largest barrier to implementing EE into preservice teacher education programs, only half of the respondents indicated that they were exposed to EE, and two-thirds of respondents indicated that their

institution was either poor or inadequate (McKeown-Ice, 2000). NAAEE developed a set of national recommendations regarding the qualifications that environmental educators need to provide high-quality EE called the *Guidelines for the Preparation and Professional Development of Environmental Educators* (Crim et al., 2017). However, most of the respondents in this study indicated they were not aware of these guidelines or did not incorporate them (Crim et al., 2017). Overall, EE in preservice teacher education programs is not institutionalized. Also, EE varies greatly where it is implemented and does not effectively prepare teachers to become environmental educators (Crim et al., 2017; Ernst, 2007; McKeown-Ice, 2000). This demonstrates the need for more adequate EPPs that properly prepare educators to develop environmentally literate citizens. Successful teacher preparation programs will not only cover environmental concepts, but will expose teachers to appropriate teaching materials that are non-biased and based in science, be collaborative, demonstrate effective teaching pedagogy in relation to environmental concepts, and show teachers how to effectively evaluate EE resources and environmental concepts (McDonald & Dominguez, 2010).

Teacher Perceptions of Environmental Education

There is very little literature specifically pertaining to teachers' perceptions of EE solely within the United States (Ernst, 2007). However, teachers' perceptions can be examined through literature discussing barriers internationally. Due to barriers to implementation such as a lack of administrative support or a lack of background knowledge, classroom teachers often have mixed feelings regarding EE. In studies conducted in the United States that analyzed science teachers' perceptions and barriers of EE, respondents indicated that they believed it is important to take class time to integrate environmental concepts that are science related (Kim & Fortner, 2006; Powers, 2004). However, teachers' ability to implement these concepts is weakened by the

perceived barriers such as lack of time, administrative support, and funding. These findings are contrasted by other studies that have found that some teachers may not believe that EE will benefit their students (Athman & Monroe, 2001). This may be due to a lack of awareness of the scientific findings regarding the beneficial effects of EE. This is particularly important because teachers' beliefs and attitudes regarding the subjects they teach are often reflected onto the children they are teaching (Crim et al., 2017). Teachers that have positive attitudes about the environment and are knowledgeable on environmental topics and pedagogy are more likely to incorporate EE and teach it effectively (Crim et al., 2017; Kim & Fortner, 2006).

Pedretti and Nazir (2014) conducted a study of teachers' perceptions of EE in Ontario, Canada. The respondents of their survey came from a variety of backgrounds, including urban areas, public English school systems, Catholic English schools, and both secondary level teachers and elementary teachers (Pedretti & Nazir, 2014). While about 92% of respondents indicated that they incorporated a form of EE into their normal teaching, only 47% stated it occurs at least once a week in the classroom (Pedretti & Nazir, 2014). The majority of respondents agreed that anthropogenically induced environmental degradation is an urgent problem and requires multi-level action and considered themselves to be allies of environmental issues (Pedretti & Nazir, 2014). The study found that participating teachers support the implementation of EE in schools, but their views are "varied and complex" (Pedretti & Nazir, 2014, p. 273). This study also found that participating teachers believed that they were isolated in their field (Pedretti & Nazir, 2014). Despite being fairly confident about EE, the teachers experienced isolation in their field because they believe that their passion is not commonly shared among their colleagues (Pedretti & Nazir, 2014). Pedretti and Nazir (2014) also discussed the need for more sufficient professional development for teachers in Ontario with respect to EE.

Because these teachers feel as if they are acting in isolation from other professional educators, expanding professional development may help bridge the gap between different types of educators. These findings are similar to those found by Ernst (2009) in the United States.

In Louisiana, Figland et al. (2018) conducted a study which identified classroom-based professional development needs of Louisiana agriculture teachers. When asked what type of technical agriculture professional development they needed the most, the majority of teachers stated that they needed more environmental and natural resource development (Figland et al., 2018). These findings are supported by the previously mentioned barriers to implementation where a lack of professional development impeded teachers' ability to incorporate EE into their curriculum. Theoretically, if agriculture teachers receive the proper professional development, they should have the ability and confidence to effectively incorporate EE into the classroom (Ajzen, 2002).

More research should be conducted concerning the views of teachers within the United States regarding EE. Understanding teachers' perceptions will allow a more streamline implementation of EE into classrooms. This study will add to the body of scientific literature by expanding on the perceptions of agriculture and science teachers of EE within the state of Louisiana.

CHAPTER 3. METHODS

This chapter explains the methodology used in conducting this study, including the guiding research questions, overall research design and the analysis of data.

Purpose and Objectives

Louisiana and its residents are heavily influenced by agricultural production and environmental degradation, which heightens the need for citizens and agricultural producers to receive environmental education (EE). There is currently no existing literature that discusses the level of EE incorporated into Louisiana classrooms. The purpose of this study is to describe the status of EE in Louisiana by surveying Louisiana Agriscience Teacher Association (LATA) members in the state. The survey instrument utilized in this study was designed to answer the following research questions:

1. To what extent do LATA members incorporate environmental education (EE) into their curriculum?
2. What factors prohibit LATA members from implementing EE?
3. To what extent do LATA members who do not implement EE intend on incorporating EE into their curriculum?
4. What do LATA members who incorporate EE perceive to be barriers to implementing EE?
5. What are LATA members' perceived benefits of EE?
6. What resources are available to assist LATA members in implementing EE?
7. For LATA members who do implement EE, what was their strongest influence to include EE into their curriculum?

Research Design

This exploratory research study utilized survey research methodology to learn more about EE availability in Louisiana high schools. Ultimately, this study aimed to describe the status of EE in Louisiana agriculture programs and to describe LATA members' perceptions, resources, and barriers to implementation. More specifically, the survey instrument was framed with Ajzen's (1991) Theory of Planned Behavior (TPB) to discover Louisiana high school agriculture teachers' (a) attitude regarding EE implementation, (b) normative beliefs of EE implementation, (c) perceived behavioral control of incorporating EE, (d) their actual behavioral control regarding implementation, (e) and their level of intention to incorporate EE in the future. This study was reviewed and approved by the Louisiana State University Institutional Review Board and the documentation can be found in Appendix B.

Prior to the distribution of the survey, a pilot study was conducted with 30 randomly selected high school agriculture teachers throughout the state of Louisiana that were not included in the primary research study. A total of 14 teachers completed the pilot study. Using the data from the pilot study, the research instrument was tested for internal reliability using Cronbach's alpha on the Likert-scale sections. These included: resource availability ($\alpha = 0.926$), barriers to implementation ($\alpha = 0.910$), support from other groups ($\alpha = 0.945$), and teachers' perceptions ($\alpha = 0.833$). Content validity within the instrument was determined by two agricultural education faculty members and an agricultural education graduate student.

Population and Sample

The target population of this study was LATA members throughout the state of Louisiana. There are 239 agriculture teachers in Louisiana that are members of the Louisiana Agriscience Teachers Association (LATA), all of which are registered on the LATA LIST-serv.

LATA is a professional organization in Louisiana specifically for agriculture teachers. This organization provides opportunities for agriculture teachers in Louisiana to participate in professional development activities and disseminates information to teachers regarding formal instruction and developments within agriculture. It is the largest and most comprehensive professional development organization for agriculture teachers in Louisiana, making it the most accessible and extensive sample of agriculture teachers in the state.

Of these members, 200 of these individuals are secondary education agriculture teachers. To access this sample, an email list of LATA members was utilized to distribute the survey electronically. A total of 84 teachers responded to the survey, however five individuals consented to the study but did not complete it and two individuals did not consent and therefore did not complete it. Removing these individuals resulted in a total of 77 completed surveys and a 38.5% response rate. However, because this study involved a census of all LATA members and not a random sample of all Louisiana high school agriculture teachers, the results of this survey are not generalizable to the entire population of agriculture teachers in Louisiana.

Demographics

Demographic information was collected at the end of the survey instrument used in this study. Through the use of a skip logic in Qualtrics, study participants were directed to separate demographics sections based on whether or not they implement EE. Those who indicated that they do not incorporate EE into their curriculum received less demographics questions pertaining to EE instruction. Although the demographic information of LATA members who do not incorporate EE and those who do incorporate EE were collected separately, it should be noted that these two groups cannot be statistically compared due to differences in sample size. LATA members in this study are predominately teaching in public schools (n = 70; 98.6%) and one

individual reported they teach at a charter school (1.4%) (see Table 3.1). Six individuals did not respond to this question. Study participants were also asked to indicate the setting of the school they teach in as defined by the U.S. Census Bureau. According to the U.S. Census Bureau, areas with 50,000 or more people are considered to be urbanized, areas with at least 2,500 but fewer than 50,000 are urban clusters, and all other areas that are not urban or urban clusters are considered to be rural. Of those who implemented EE, five teach in an urban area, 31 teach in an urban cluster, and 34 are in rural areas (see Table 3.2). Of those who did not incorporate EE, one stated that they teach in an urban setting, four teach in an urban cluster, and four teach in a rural area (see Table 3.2). Eight individuals did not respond to this demographics section.

Table 3.1. LATA Member School Type

Variable	*f*	%
Item		
Public	70	98.6
Charter	1	1.4

Table 3.2. LATA Member School Setting

Variable	Urban	Urban cluster	Rural	Total
LATA Member Type				
Implements EE	5	31	34	69
Does not implement EE	1	4	4	9

To gain an understanding on the EE programming associated with LATA members, study participants were asked to indicate if their teaching approach or program is associated with a state or national program that encourages EE. All the participants who did not implement EE (*n* = 8) reported that their teaching approach is associated with a state or national program that encourages EE. Of those who did implement EE, 35 stated that they do not have an association

and 25 stated that they do (see Table 3.3). Nine individuals did not respond to this demographics question.

Table 3.3. LATA Members whose teaching approach/program associated with a state or national program that encourages EE

	Yes	No
LATA Member Type		
Implements EE	25	35
Does not implement EE	8	0

LATA members were also asked if their teaching approach or program was associated with a training or professional development program that encourages EE. Of the study participants who implemented EE into their curriculum (n = 36), 31 do not use a teaching approach or program associated with a training or professional development program that encourages EE while five individuals do. Interestingly, four of the five individuals who did not incorporate EE into their curriculum did not use a teaching approach or program associated with EE training or professional development (see Table 3.4). Seven individuals did not answer this demographics section.

Table 3.4. LATA Members whose teaching approach/program associated with a training or professional development program that encourages EE

	Yes	No
LATA Member Type		
Implements EE	5	31
Does not implement EE	1	4

To understand which grade levels LATA members are currently teaching, study participants were given a multiple-choice selection and could select all grades that apply. Because of this, the total number of responses will exceed the number of study participants. The

sample population consisted of solely high school teachers, so respondents were able to choose between grades nine and 12. There was a relatively even distribution of grades taught for both groups (see Table 3.5).

Table 3.5. LATA Member Grade Level Taught

Grade	Does Not Implement EE	Does Implement EE
9	5	55
10	6	57
11	7	58
12	7	56

After LATA members were asked to indicate which grade levels they teach, they were asked to report on the subject areas they currently teach. This question was multiple choice and respondents could choose all that applied. They were allowed to chose between (a) agriculture, (b) biology, (c) chemistry, and (d) environmental science. Of those who do not implement EE, nine stated that they taught agriculture and one taught environmental science. Biology and chemistry were not chosen by individuals who implement EE. Agriculture was chosen by 61 individuals who incorporate EE while biology was chosen twice, chemistry was chosen once, and environmental science was chosen three times (see Table 3.6).

Table 3.6. LATA Member Subject Area Taught

Subject	Does Not Implement EE	Implements EE
Agriculture	9	61
Biology	0	2
Chemistry	0	1
Environmental Science	1	3

Next, LATA members were asked to indicate how many years they have been teaching in a classroom, even if it did not involve agricultural or environmental instruction. The range of years taught in a classroom for LATA members who implement EE (n = 59) was between one and 39 years with a mean of 16.67, and a standard deviation of 10.61. Those who do not implement EE (n = 9) had a range of three to 32 years teaching with a mean of 12.89 and a standard deviation of 11.15 (see Table 3.7). Only individuals who indicated that they incorporate EE were asked to report on how many years they have incorporated EE into their curriculum. The average of these individuals (n = 59) was 14.03 years with a range of one to 32 years and a standard deviation of 10.022 (see Table 3.8).

Table 3.7. LATA Member Number of years completed teaching in a classroom in any subject

Variable	Range	*M*	*SD*	*n*
LATA Member Type				
Implements EE	1-39 years	16.67	10.61	59
Does not implement EE	3-32 years	12.89	11.15	9

Table 3.8. LATA Members years of incorporating EE into the curriculum (n = 59)

Variable	Range	M	SD
	1-32	14.03	10.022

Next, both groups were asked to indicate which, if any, teacher certifications they have earned. Each individual from both groups stated that they have at least one teacher certification, with the most frequently selected certification being in agriculture in both groups (see Table 3.9).

Table 3.9. LATA Member Teacher Certification

LATA Member Type	Does not Incorporate EE	Incorporated EE
Item		
None	0	0
Agriculture	8	56
Biology	3	15
Chemistry	0	1
Earth Science	0	1
Environmental Science	0	3
General Science	1	8
Mathematics	0	2
Physics	0	1

Lastly, both groups were asked to select certain characteristics that may describe their EE curriculum. Respondents who do not incorporate EE were given the option to choose *does not use EE*, which was selected twice (2.6%). The most frequently selected characteristics included: (a) interdisciplinary (39%), (b) focus on the natural environment (37.7%), and (c) project, problem, or issue-based learning experiences (33.8%).

Table 3.10. LATA members reported characteristics of their EE curriculum

	f	%
Item		
Does not use EE	2	2.6
Interdisciplinary	30	39
Focus on the natural environment	29	37.7
Focus on socio-cultural environment	3	3.9
Project, problem, or issue-based learning experiences	26	33.8

(table cont'd.)

Item	*f*	%
Service-learning experiences	21	27.3
Learner-centered instruction	14	18.2
Constructivist approaches	3	3.9
Team teaching	1	1.3
Cooperative learning	23	29.9

Instrumentation

This study used an electronic survey designed through Qualtrics and was distributed via email to high school agriculture teachers in Louisiana who are members of LATA. Coverage error was reduced by distributing the survey via email, as every member of LATA is included in an online LIST-serve. The survey was modified from an instrument developed by Julie Ernst (2009), who conducted similar research with teachers and EE in the United States. Written permission to use her instrument with modifications was given via email (see Appendix D). Using guidelines provided by Dillman, Smyth and Christian (2009), the original instrument was modified to become an online survey and refitted to accommodate different variables of interest. Ernst (2009) utilized a paper survey and distributed it via mail to her research sample, so the instrument was reformatted for this study to be an electronic Qualtrics survey. Since the original instrument was designed to be distributed to fifth to eighth grade teachers and had a focus on environment-based education, the terminology and focus were modified to accommodate this study. The demographics section was moved to the end of the survey as recommended by Dillman, Smyth and Christian (2009). The original instrument had similar variables of interest, including discovering what influenced teachers to incorporate EE into their curriculum. However, the Likert-scale table for this objective was removed and instead used simple text entry where respondents were asked to report on their greatest influence to incorporate EE. The

original instrument was also designed to discover which resources are available to assist teachers to implement EE and what barriers impede implementation. The Likert-scales for these objectives were kept for this study, but several items were removed to condense the survey. An additional question on levels of intention was included in this survey, which was not included in Ernst's (2009) original instrument. An optional incentive was provided for survey participants, which was not included in Ernst (2009) study. After participants completed the survey, they were given the opportunity to enter in a random drawing for an Amazon.com gift card. After completion, the instrument for this study was designed to determine if agriculture teachers in Louisiana are implementing EE, their perceptions on EE, their perceived barriers to implementation, if they receive support from other groups, and the EE resources they have access to.

To ensure clarity for the survey respondents, EE and environmental literacy were defined for each participant prior to the beginning of the survey. Using a definition from Stapp (1969), EE was defined as "an educational process aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution" (pp. 31-32). EE was also explained as having a primary emphasis on fostering environmental literacy, which was defined as "the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems" (Disinger, 2001, p. 9). This section also included a list of topics that may be included in EE instruction: (a) ecology, (b) forestry, (c) evolution, (d) geology, (e) plants, (f) wildlife, (g) hydrology, (h) natural resource management, (i) biospheres/climate, (j) entomology, (k) sustainability, (l) pollution, (m) fisheries, (n) aquaculture, (o) waste management, and (p) agriculture.

The survey was tailored using skip logics to give a different set of questions to participants depending on if they indicated that they incorporated EE in their curriculum. The first question in the survey asked participants to indicate the level of EE that they incorporate into their teaching, ranging from not including EE at all to using EE as a theme for the majority of their class instruction. Skip logics directed respondents who indicated that they either (a) teach one to two class periods with EE, (b) teach an entire unit on EE, (c) teach an entire course dedicated to EE, or (d) use EE as a theme for the majority of teaching in the first section to a set of questions regarding their perceptions, barriers to implementation, influences to incorporate EE, resource availability, and perceived benefits of EE. If a respondent indicated that they did not implement EE, the skip logic directed them to a shorter survey, for most of the other questions pertained to teachers who implement EE. The first section of this version of the survey asked participants to indicate reasons why they have not incorporated EE in their classroom. A list of potential barriers and perceptions were provided as a multiple-choice selection. The following section asked participants to indicate to what extent they intended to include EE in their curriculum in the future. The final section asked about demographic information and gave respondents the opportunity to participate in the gift card drawing.

Survey participants who indicated that they (a) *teach one to two class periods with EE*, (b) *teach an entire unit on EE*, (c) *teach an entire course dedicated to EE*, or (d) *use EE as a theme for the majority of teaching* were directed to a longer set of questions. The first section of this survey was multiple choice and asked respondents to indicate which of the potential 17 topics they included in their EE instruction. The following section entailed a simple text entry and asked participants to specify what influenced them the most to include EE into their curriculum. Next, respondents were asked to rank on a Likert-scale the extent in which certain

resources were available to assist them in implementing EE into their curriculum. The following section also entailed a Likert-scale and prompted participants to rank the extent in which they received support from various groups, including (a) *school administration,* (b) *the school board,* (c) *other teachers in their school,* (d) *parents*, (e) *students,* and (f) *community partners*. Next, respondents were asked to rank on a Likert-scale the extent in which potential barriers presented difficulties in implementing EE into their classroom. The following section asked respondents to rank on a Likert-scale the extent in which they perceive items to be results of EE. These perceptions entailed possible benefits of EE for their students, including (a) *improved academic achievement in other subjects,* (b) *improved classroom behavior,* (c) *improved environmental literacy,* (d) *improved critical thinking skills,* (e) *improved problem-solving skills,* and (f) *an increased interest in the environment*.

Pilot Study

Prior to distributing the survey, a pilot study was conducted with 30 high school agriculture teachers throughout Louisiana who were randomly selected but not included in the research sample. A total of 14 teachers completed the pilot study. To ensure internal reliability within the research instrument, Cronbach's alpha was performed on the Likert-scale items, which included questions on (a) resource availability, (b) barriers to implementation, (c) support from various groups and (d) teachers' perceptions. The section on resource availability received a Cronbach's alpha value of 0.926, the barriers section was 0.910, the support section was 0.945, and teachers' perceptions was 0.833. Since the common threshold for acceptable consistency is 0.70, each of these items were considered reliable and remained in the instrument.

Data Collection

This study utilized a tailored design method to collect and analyze data. The survey population consisted of all LATA members, all of which can all be contacted via email through the LATA LIST-serv. To minimize coverage error and reduce costs, a Qualtrics survey was developed and the LIST-serv was utilized to access the entire population. On Monday, December 10, 2018 an initial email was distributed to the population sample to introduce the survey to members of the study prior to implementation. To increase the response rate, the initial contact informed LATA members of an optional incentive to participate in a $25 Amazon.com eGift card drawing after completing the survey. Survey participants who reached the end of the survey were asked to send an email to the researcher if they wished to participate in the incentive. The survey went live when it was first distributed via email on December 12, 2018. A total of five points of contact through reminder emails were sent at approximately one week apart to the LATA LIST-serv (see Appendix A). Because the population consisted of high school teachers, contacts were made midday in the middle of the week when teachers were expected to have more time available. Contacts were not made over the winter holidays. Data from the completed sample was collected through Qualtrics and compiled and coded into SPSS for analyzation. Because this study involved a census of all LATA members, methods to reduce nonresponse error were not implemented.

Data Analysis

The data were analyzed using SPSS Version 25 using descriptive statistics including frequencies, percentages, and measures of central tendency (i.e., mean, median, and mode). To understand to what extent EE is being implemented into Louisiana high school agriculture teachers' curriculum, survey respondents were asked to indicate what level of EE they

incorporated into their curriculum as well as which EE topics they included in instruction. The results from this objective were analyzed by generating frequencies and percentages. The second research question, which entailed understanding what factors prohibit teachers from incorporating EE entirely, was also analyzed through frequencies and percentages. Next, the third through sixth research questions were all analyzed using means, standard deviations, and a grand mean. The final research question entailed a simple text entry which prompted participants to indicate their primary influence to incorporate EE into their curriculum. The researcher compiled the responses for this question and grouped answers into major themes using the survey from Ernst (2009) as a guide. The responses were then manually analyzed for frequencies and percentages.

CHAPTER 4. RESULTS

This study aimed to understand the status of EE in Louisiana through a census of high school agriculture teachers who are members of LATA.

Question 1: To what extent do LATA members in Louisiana high schools incorporate environmental education (EE) into their curriculum?

To answer the first research question, respondents were asked to report on how often they incorporate EE into their curriculum. The data for this section was analyzed using frequencies and percentages. Of the 77 individuals who responded, only 10 (13%) of individuals indicated that they do not include EE in their curriculum at all. Almost half (46.8%) of the respondents indicated that they teach one to two class periods that include EE and 31.2% indicated that they teach an entire unit on EE.

Table 4.1. Level of environmental education implemented in classroom instruction by LATA members

Variable	*f*	%
Item		
I do not incorporate environmental education at all into my curriculum	10	13
I teach 1-2 class periods that include environmental education	36	46.8
I teach an entire unit on environmental education	24	31.2
I teach an entire course dedicated to environmental education	2	2.6
I use environmental education as a theme for the majority of my teaching	5	6.5
Total	77	100

Table 4.2. Environmental education topics included in LATA members' class curriculum

Topic	*f*	Percent	Topic	*f*	%
Agriculture	62	80.5	Ecology	19	24.7
Wildlife	43	55.8	Fisheries	17	22.1
Forestry	42	54.5	Silviculture	15	19.5
Natural resource management	40	51.9	Green energy	10	13.0
Horticulture	39	50.6	Geology	9	11.7
Aquaculture	30	39.0	Hydrology	9	11.7
Entomology	26	33.8	Evolution	9	11.7
Sustainability	25	32.5	Biospheres/Climate	6	7.8
Pollution	24	31.2	Other	2	2.6

The ten respondents who indicated that they do not incorporate EE into their curriculum were not asked about EE topics due to a skip logic in Qualtrics. Therefore, only those who indicated that they incorporate EE into their curriculum at some level were able to report on which EE topics they include in their curriculum. Frequencies and percentages were generated for analysis. The most commonly reported topics included in EE instruction were: (a) agriculture (80.5%), (b) wildlife (55.8%), (c) forestry (54.5%), and (d) natural resource management (51.9%). Two individuals (2.6%) wrote in topics that were not included in the provided list: (a) hunter's education, (b) EPA regulation, and (c) environmental safety.

Question 2: What factors prohibit Louisiana high school LATA members from implementing EE?

Table 4.3. Factors that prohibit LATA members from incorporating environmental education

Item	*f*	%
The subject area currently teaching	5	6.5
Lack of access to environmental education teaching materials	4	5.2
Lack of planning time	3	3.9
Concerns regarding classroom management when outside of the classroom	2	2.6
Lack of environmental content knowledge	2	2.6
Grade level currently teaching	2	2.6
Lack of interest in incorporating environmental education	1	1.3
Emphasis on state standards	1	1.3
Emphasis on state testing	1	1.3
Lack of administrative support	1	1.3
Lack of transportation	1	1.3
Lack of natural area to study	1	1.3
Counter to school climate	1	1.3
Other	1	1.3

The ten individuals who indicated that they do not include EE in their curriculum were asked to indicate if any of the provided barriers prohibited them from incorporating EE. Since respondents were prompted to choose all options that were applicable, the total is not equal to the total number of respondents. Frequencies and percentages were calculated to analyze this data. The most frequently chosen options included: (a) *the subject area currently teaching* (n = 5), (b) *lack of access to environmental education teaching materials* (n = 4), and (c) *lack of planning time* (n = 3).

Question 3: To what extent do Louisiana high school LATA members who do not implement EE intend on incorporating EE into their curriculum?

The respondents who indicated that they do not include EE in their curriculum at all were asked to report on their level of intention regarding incorporating EE in the future. Of these ten respondents, 9 reported on their level of intention (Table 4). The data for this section was analyzed using a mean, standard deviations, and a grand mean. The data was coded so that a higher mean indicates a higher level of agreement, with a mean equaling four being the highest level of agreement. When asked if they will implement EE into their classroom, respondents disagreed (M = 2.33; SD = 0.707). Respondents agreed on the following statements: (a) I intend to implement EE into my classroom curriculum (M = 2.56; SD = 0.726), (b) I expect to implement EE into my classroom curriculum (M = 2.67; SD = 0.707), (c) I plan to implement EE into my curriculum (M = 2.78; SD = 0.667), and (d) I will try to implement EE into my classroom curriculum (M = 3.00; SD = 0.5). However, a grand mean of 2.67 suggests that respondents agree that they will intend to incorporate EE in the future.

Table 4.4. LATA members level of intention to incorporate environmental education

Item	N	Mean	Std. Deviation
I will implement environmental education into my classroom	9	2.33	0.707
I intend to implement environmental education into my classroom curriculum	9	2.56	0.726
I expect to implement environmental education into my classroom curriculum	9	2.67	0.707
I plan to implement environmental education into my curriculum	9	2.78	0.667
I will try to implement environmental education into my classroom curriculum	9	3.00	0.500
Grand Mean		2.67	0.600

Question 4: What do Louisiana high school LATA members who incorporate EE perceive to be barriers to implementing EE?

To answer the fourth research question, respondents who indicated that they incorporate EE into their curriculum were asked to report on a Likert-scale if they perceived any of the presented items as barriers to EE instruction. The data from this section was analyzed by generating a mean, standard deviation, and grand mean for each item (see Table 5). A lower mean indicates that the item was a strong obstacle while a higher mean indicates that the item was less of an obstacle. Respondents did not indicate any of the items as almost preventing implementation or as a strong obstacle. As reported, the strongest obstacles included: (a) *lack of funding*, (b) *lack of training or professional development opportunities*, (c) *lack of access to EE teaching materials*, (d) *lack of planning time*, and (e) *emphasis on state testing*, although the means indicate that they were considered as somewhat of an obstacle. Only one item was reported as not being an obstacle in implementing EE: lack of comfort in the outdoors (M = 4.56; SD = 0.807). The grand mean for the group was 3.85, meaning that the sample considered these items to be minor obstacles.

Table 4.5. LATA members perceived barriers to environmental education implementation

Item	N	Minimum	Maximum	Mean	Std. Deviation
Lack of funding	61	1	5	3.13	1.218
Lack of training or professional development opportunities	61	1	5	3.31	1.088
Lack of planning time	61	1	5	3.39	1.269
Lack of access to EE teaching materials	61	1	5	3.43	1.190
Emphasis on state testing	60	1	5	3.45	1.346
Lack of transportation	61	1	5	3.54	1.246
Lack of community interests/community partners	61	1	5	3.69	1.119

(table cont'd.)

Item	N	Minimum	Maximum	Mean	Std. Deviation
Emphasis on state standards	58	1	5	3.71	1.155
Lack of natural area to study	60	1	5	3.80	1.176
Concerns regarding safety, liability, and classroom management when outside the classroom	61	1	5	3.80	1.289
Lack of environmental content knowledge	61	1	5	3.85	0.980
Lack of procedural/pedagogical knowledge	61	1	5	3.93	0.929
Lack of support from parents	61	1	5	3.93	1.124
Lack of administrative support	60	1	5	4.20	0.988
Counter to school climate	60	2	5	4.20	1.005
The grade level I teach	61	1	5	4.25	0.994
The subject area I teach	61	1	5	4.33	0.995
Lack of comfort being in the outdoors	61	1	5	4.56	0.807
Grand mean				3.85	1.005

Question 5: What are Louisiana high school LATA members' perceived benefits of EE?

This research question aimed to discover if Louisiana high school agriculture teachers perceived any benefits for students who receive EE instruction. The data was coded so that a lower mean represented disagreement and a higher mean indicates agreement with the respective statement. According to these results, the respondents did not disagree with the potential benefits. The grand mean was 2.99, indicating that the respondents generally agreed with the given statements.

Table 4.6. LATA members perceived benefits of environmental education

Item	N	Minimum	Maximum	Mean	Std. Deviation
Students have improved classroom behavior	60	1	4	2.52	0.596
Students have improved academic achievement in other subject areas	61	2	4	3.02	0.428
Students have improved problem solving skills	61	2	4	3.02	0.5
Students have improved critical thinking skills	60	2	4	3.08	0.462
Students have increased interest in the environment	61	2	4	3.18	0.563
Students have improved environmental literacy	61	2	4	3.21	0.52
Grand Mean				2.99	0.34

Question 6: What resources are available to assist Louisiana high school LATA members in implementing EE?

Table 4.7. Availability of environmental education resources for LATA members

Item	Scale	*f*	%
EE teaching materials	Have not used	7	9.1
	Unavailable	3	3.9
	Rarely available	10	13.0
	Sometimes available	32	41.6
	Readily Available	12	15.6
	Total	64	
A mentor or coach (another teacher) who uses EE	Have not used	14	18.2
	Unavailable	9	11.7
	Rarely available	15	19.5
	Sometimes available	21	27.3
	Readily Available	5	6.5
	Total	64	

(table cont'd.)

Item	Scale	*f*	%
In-service staff development in environmental science/ecology	Have not used	12	15.6
	Unavailable	22	28.6
	Rarely available	17	22.1
	Sometimes available	8	10.4
	Readily Available	4	5.2
	Total	63	
In-service staff development in EE instructional strategies or materials	Have not used	14	18.2
	Unavailable	23	29.9
	Rarely available	14	18.2
	Sometimes available	9	11.7
	Readily Available	3	3.9
	Total	63	
In-service staff development in using the environment as an integrating context for integrating subject areas and a source of real world projects	Have not used	12	15.6
	Unavailable	24	31.2
	Rarely available	17	22.1
	Sometimes available	9	11.7
	Readily Available	2	2.6
	Total	64	
In-service staff development in comprehensive school reform strategies	Have not used	16	20.8
	Unavailable	22	28.6
	Rarely available	18	23.4
	Sometimes available	5	6.5
	Readily Available	2	2.6
	Total	63	

(table cont'd.)

Item	Scale	*f*	%
Administrative support	Have not used	11	14.3
	Unavailable	9	11.7
	Rarely available	6	7.8
	Sometimes available	22	28.6
	Readily Available	16	20.8
	Total	64	
Funding to support EE in my classroom	Have not used	10	13.0
	Unavailable	16	20.8
	Rarely available	23	29.9
	Sometimes available	10	13.0
	Readily Available	5	6.5
	Total	64	
Transportation for traveling to field/study sites	Have not used	12	15.6
	Unavailable	10	13.0
	Rarely available	19	24.7
	Sometimes available	16	20.8
	Readily Available	7	9.1
	Total	64	
A program coordinator at my school to assist with implementation	Have not used	11	14.3
	Unavailable	34	44.2
	Rarely available	13	16.9
	Sometimes available	4	5.2
	Readily Available	2	2.6
	Total	64	

(table cont'd.)

Item	Scale	*f*	%
Professional development programs and educator resources such as: - Project Learning Tree - Project WET - Project WILD - Louisiana Environmental Education Association (State affiliate to the North American Association for Environmental Education) - Other	Have not used	22	28.6
	Unavailable	9	11.7
	Rarely available	13	16.9
	Sometimes available	14	18.2
	Readily available	5	6.5
	Total	63	

The sixth research question involved understanding the level of resources available to Louisiana high school agriculture teachers to assist them in implementing EE. To answer this question, respondents were asked to report on the extent in which some resources were available to them and if they received support from other groups to implement EE into their curriculum. Frequencies and percentages were generated for resource availability and can be seen in Table 7. The following three items were reportedly the most available: (a) *EE teaching materials* (41.6%), (b) *a mentor or coach (another teacher) who uses* EE (27.3%), and *administrative support* (28.6%). However, these items were only considered to be sometimes available. Two items were mostly considered to be rarely unavailable: (a) *funding to support EE in my classroom* (29.9%) and (b) *transportation for traveling to field/study sites* (24.7%). Most of the items were generally considered to be unavailable: (a) *in-service staff development in EE instructional strategies or materials* (29.9%), (b) *in-service staff development in environmental science/ecology* (28.6%), (c) *in-service staff development in using the environment as an integrating context for integrating subject areas and a source of real world projects* (31.2%), (d) *in-service staff development in comprehensive school reform strategies* (28.6%), and (e) *a*

program coordinator at my school to assist with implementation (44.2%). Lastly, most respondents indicated that they have not used professional development programs and educator resources (28.6%) and only 6.5% considered them to be readily available.

Table 4.8. LATA members perceived support from other groups to implement environmental education

Group	N	Minimum	Maximum	Mean	Standard Deviation
Parents	54	1	5	3.63	1.01
Community partners	53	1	5	3.66	0.99
Students	57	1	5	3.77	0.93
School board	54	1	5	3.81	1.08
Other teachers in my school	57	1	5	3.89	1.05
Administration in my school	57	1	5	4.11	1.03
Grand mean				3.77	

Respondents were also provided the option to select "does not apply" on the Likert-scale. Frequencies for this option are as follows: (a) *administration in my school* = 6, (b) *school board* = 9, (c) *other teachers in my school* = 6, (d) *parents* = 9, (e) *students* = 6, and (f) *community partners* = 10.

To determine if respondents received support from other groups regarding implementing EE into their classroom curriculum, participants were asked to report on a Likert-scale the extent in which certain groups are supportive. The data from this question was analyzed by generating means, standard deviations, and a grand mean, which can be seen in Table 8. It was coded so that a lower mean represents opposition while a higher mean indicates more support. The grand mean for this section was 3.77, indicating that overall these groups show some support for implementing EE. None of the items received a mean score indicating that a group fully opposed

the incorporation of EE. The most supportive group was administration with a mean of 4.11 (*SD* = 1.03).

Question 7: For Louisiana high school LATA members who do implement EE, what was their strongest influence to include EE into their curriculum?

To answer the seventh research question, respondents were asked to state what their strongest influence to incorporate EE into their curriculum was via a simple text entry on the survey instrument. The results of this question were manually organized using Ernst (2009) instrument as a guide, as the instrument used in Ernst (2009) included a similar question but used a multiple item Likert-scale. Frequencies and percentages were generated manually and can be seen in Table 9. The most commonly reported influence was that agriculture and the environment are intrinsically linked (*n* = 19). Other commonly reported influences included (a) required by standards (*n* = 11), (b) knowledge of environmental issues (*n* = 8), and (c) a desire for students to be environmentally responsible (*n* = 6). Five of the 63 responses to the question could not easily fit within the broad topics or did not provide sufficient information, so they were coded as "other". These responses included (a) forestry competitions, (b) textbook, (c) CASE training, (d) none, and (e) time.

Table 4.9. LATA members' major influences to incorporate EE

Category	*f*	%
Agriculture and the environment are linked	19	30.2
Required by standards	11	17.5
Knowledge of environmental issues	8	12.7
Desire for students to become environmentally responsible	6	10.0
Where I live	4	6.3
Personal interest in the environment and/or nature	4	6.3

(table cont'd.)

Category	*f*	%
Advanced/graduate study in environmental science/related science	3	4.8
Students want to learn about the environment	2	3.2
Previous work experience relating to the environment	1	1.6
Other	5	7.9
Total	63	

CHAPTER 5. CONCLUSIONS, DISCUSSIONS, RECOMMENDATIONS

The purpose of this study was to gain a deeper understating of the status of EE in Louisiana high school agriculture classrooms. According to Icek Ajzen's (1991) Theory of Planned Behavior (TPB), several factors must be considered when discussing human behavior. This theory states that there are three considerations that primarily guide human behavior: (a) beliefs about the likely consequences or other attributes of the behavior (behavioral beliefs), (b) beliefs about the normative expectations of other people (subjective norm), and (c) beliefs about the presence of factors that may further or hinder performance of the behavior (perceived behavioral control) (Ajzen, 2002, p. 665). Together, along with actual behavioral control, these factors form the behavioral intention to carry out a certain behavior (Ajzen, 2002). For this study, Louisiana Agriculture Teacher Association (LATA) members were asked to report on factors regarding implementing EE into their classroom curriculum. Specifically, LATA members were asked to report on their perceptions, the level of support they receive, the resources they have access to, and obstacles they face regarding EE implementation. LATA members who indicated that they did not incorporate EE into their curriculum were asked to describe their level of intention to implement EE in the future. Prior to this study, there was no scientific literature regarding Louisiana teachers' perceptions and implementation of EE. Furthering the understanding of these conditions will aid in facilitating EE implementation in the future

To gain understanding on the level of EE incorporated by LATA members, LATA members were asked to indicate the degree in which they incorporate EE into their curriculum and to list the EE topics they include in instruction. The results of this study suggest that LATA members are not incorporating EE into their curriculum regularly. Because of the content covered in agricultural education, it is unsurprising that agriculture teachers include some

environmental content in their curriculum. However, including environmental content in only one to two class periods or in a single unit, which typically involves one to three weeks of instruction in a year, may not be substantial (Hungerford & Volk, 1990). Although the inclusion of environmental content in instruction influences students' environmental literacy, restricting inclusion to this degree may not make a significant impact on students' environmental knowledge or lead to changes in behavior (Hungerford & Volk, 1990). EE instruction is inherently multidisciplinary and encompasses a range of potential topics including agriculture (Ardoin et al., 2018). However, agricultural instruction will typically incorporate particular topics relating to the environment, such as (a) sustainability, (b) natural resource management, (c) pollution, (d) entomology, and (e) forestry.

Of those individuals that reportedly incorporate EE, the most commonly reported topic included in EE instruction was agriculture. Since the sample involved solely agriculture teachers, this result was somewhat anticipated. As agriculture teachers, every respondent theoretically should have responded that they include agriculture in their EE instruction. The remainder of respondents who did not choose agriculture as an EE topic may not have done so because they do not consider agriculture to be a component of environmental instruction or because they do not tie in agricultural topics to the environment. Alternatively, LATA members' differing perspectives may have influenced them to define EE differently and therefore believe that EE encapsulates different topics. The major agricultural industries in Louisiana differ by location, which means land management objectives will also vary and will influence perceptions of what EE entails. Because of this, LATA members in this study may simply have different perspectives on the topics included in EE instruction. For example, focusing on forest biology in comparison to silviculture. Because of this, LATA members are likely incorporating EE into their curriculum

more often than this study reveals due to differences in perspectives and EE definitions. Other EE topics presented in the survey instrument were understandably chosen frequently due to the link between the environment and agricultural practices: (a) forestry, (b) natural resource management, (c) pollution, and (d) entomology. If LATA members are teaching their students about forestry, pollution, or natural resource management for more than a few days or for a single unit, they may be incorporating EE more often than described through this study. These individuals may not consider their instruction to overlap with EE instruction. Because EE is inherently multidisciplinary and educators may require additional support and resources to implement it into their curriculum (Athman & Monroe, 2001). Therefore, lacking access to these resources may present obstacles for individuals who are interested in implementing EE.

LATA members are receiving some support from their school administration, school board, other teachers in their school, students' parents, the students, and community partners regarding EE implementation. Research suggests that teachers who receive support from administration and their peers will have less difficulty implementing EE into their curriculum as long as they are not impeded by other obstacles (Pedretti & Nazir, 2014). When LATA members who incorporate EE into their curriculum were asked to report on their perceived barriers to implementation, the reportedly strongest barrier was a lack of funding. However, this was only considered to be somewhat of a barrier. This finding is supported by similar previous research where a lack of funding was found to impede EE implementation (Cherif, 1992; Ernst, 2007; Ernst, 2012; McDonald & Dominguez, 2010; Kim & Fortner, 2006). A lack of training or professional development opportunities was also considered to be somewhat of a barrier to EE implementation, which is further supported by a study conducted by Figland et al. (2018) with Louisiana agriculture teachers. A lack of professional development opportunities may be

particularly important for educators who wish to include EE in their classroom because EE is intrinsically interdisciplinary and therefore more difficult to implement successfully (Kim & Fortner, 2006). If LATA members did not receive an education that specifically prepared them for interdisciplinary instruction or environmental instruction, a lack of professional development could be a significant obstacle in implementing EE. However, respondents reportedly consider these to be minor obstacles, meaning a lack of funding and professional development are not preventing LATA members from incorporating EE. Respondents who incorporate EE reported that they do not have access to EE teaching material resources to assist with implementation and consider it to be somewhat of an obstacle. This indicates that LATA members who wish to incorporate EE into their curriculum believe that they are in need of more readily available EE teaching materials to assist in implementation. However, the North American Association for Environmental Education (NAAEE), Project WET, and Project WILD all provide free teaching materials through their website for educators who wish to incorporate environmental content in their curriculum. These materials include lesson plans, journal articles, and instructional videos for environmentally related projects. These individuals may be unaware of these resources or are unfamiliar with these organizations. Despite the availability of several free and easily accessible EE related resources for educators online, it may not be enough to encourage incorporation of EE if it is unfamiliar (McDonald & Dominguez, 2010; Paul & Volk, 2002). Educators seemingly require pedagogy, environmental concepts and content to be purposefully integrated within teacher preparation programs if they are to implement new content into their curriculum (McDonald & Dominguez, 2010). LATA members who reportedly do not incorporate EE into their curriculum seem to possess different perceptions regarding barriers to EE implementation.

To understand which barriers prohibit Louisiana agriculture teachers from implementing EE, LATA members who do not incorporate EE were asked to report on any perceived barriers to implementation. Ten individuals in this study reported that they do not incorporate EE into their curriculum at all. Of these ten individuals, the most frequently reported barrier was the subject area they currently teach. These agriculture teachers may not consider EE as a component of agriculture, and therefore believe that agricultural instruction impedes implementing environmental instruction. This is a perceived barrier because environmental and agricultural instruction cover overlapping topics. These individuals may also be restricted by a National Center for Construction Education and Research (NCCER) certification. For schools who participate in this program, agriculture teachers must focus on ensuring their students earn their certification. This would be considered an actual barrier, for these individuals are restricted in the additional content they can cover in class. The following barriers were only selected once by respondents who do not implement EE: (a) lack of interest in incorporating EE, (b) emphasis on state standards, (c) emphasis on state testing, (d) lack of administrative support, (e) lack of transportation, (f) lack of natural area to study, and (g) counter to school climate. Despite only encompassing a small portion of the population, it is still important to consider these individuals. At least one of the LATA members felt that these barriers were strong enough to prohibit them from implementing EE into their curriculum. These findings are supported by previous research where (a) an emphasis on state testing, (b) emphasis on state standards, (c) lack of administrative support, (e) a lack of transportation and (f) lack of a natural area to study were reported as barriers to implementing EE (Athman & Monroe, 2001; Blanchet-Cohen, 2013; Cherif, 1992; Ernst, 2007, 2012; McDonald & Dominguez, 2010; Kim & Fortner, 2006). Although some

LATA members do not include EE in their curriculum, they reported an intent to incorporate EE in the future.

LATA members' responses suggest they intend, expect, plan, and will try to implement EE. However, when asked if they *will* implement EE in the future, they disagreed. This may be due to a lack of access to teaching materials or the subject area they teach, which affect the actual behavioral control of the respondents and therefore their intention levels. With a low agreement to intend to implement EE into their curriculum, LATA members may feel that their efforts to implement EE will not become a reality. In relation to Ajzen's TPB (1991), if agriculture teachers in Louisiana are impeded by barriers to complete implementation, they will not develop the behavioral intention needed to successfully implement EE.

Utilizing Ajzen's TPB (1991), Haney, Czerniak, and Lumpe (1996) conducted a study with Ohio science teachers to understand what influenced their intention to incorporate the Ohio Competency Based Science Model into their classroom curriculum. Although the teachers' subjective norm, perceived behavioral control, and attitudes toward the behavior all made a statistically significant impact on their intention levels, their attitude towards the behavior was the most significant (Haney et al., 1996). Haney et al. (1996) found that teachers' attitudes have the greatest impact on the inclusion of new material in classroom instruction. Also, teachers who were the most familiar with the proposed model had more positive attitudes regarding implementation and had higher perceived behavioral control, however they were concerned less with potential barriers to implementation than they were with the proposed model's potential positive or negative impacts on their students (Haney et al., 1996). These findings are supported by similar research where teachers' attitudes played a significant role in their intention levels (Czerniak & Lumpe, 1996; Orafi & Borg, 2009). These findings suggest that if LATA members

are to further implement EE in the future, they must be familiar with EE instruction and topics, but perhaps most importantly, have positive attitudes regarding its implementation. When teachers are in the classroom, they will do what they believe is best for their classroom and their students' learning (Cuban, 1990). As educators, teachers play a significant role in the quality of instruction and fostering positive student outcomes (Stern et al., 2013). Participants agreed that students (a) have improved academic achievement in other subject areas, (b) have improved classroom behavior, (c) have improved environmental literacy, (d) have improved critical thinking skills, (e) have improved problem-solving skills, (f) have increased interest in the environment. However, according to the grand mean that was generated, this was a weak level of agreement. It should also be noted that the item *students have improved classroom behavior* had a very low agreement level that bordered on disagreement. This suggests possibly conflicting beliefs among LATA members on whether or not EE is beneficial for students. If teachers possess positive attitudes towards the behavior and believe it is beneficial for their students, they are more likely to form the behavioral intention to incorporate new instruction into their curriculum.

LATA members' most frequently reported influence to incorporate EE into their curriculum was that agricultural practices and the environment are linked. This implies that these individuals believe that agricultural education simultaneously includes lessons on the environment. Some individuals' responses went further to explain that the environment is impacted by agricultural practices, so it is therefore agriculture teachers' responsibility to emphasize this connection to their students. Others indicated that they were influenced to incorporate EE into their curriculum because of curriculum standards. However, they did not specifically state which entity enforces these standards. The Louisiana Department of Education

provides content specific guidelines for high school agriculture classes, but they are not specifically mandated. Topics include but are not limited to: (a) forestry, (b) soil science, (c) environmental science, (d) entomology, and (e) wildlife management. These individuals may include topics pertaining to environmental instruction because they are included in the content guidelines. Another commonly reported influence was knowledge of environmental issues. More specifically, several respondents explained that their knowledge of soil erosion along the coast of Louisiana was a major influence to incorporate EE into their curriculum. Soil erosion and lack of vertical sediment accretion are significant environmental issues in coastal and inland Louisiana, making this an important topic of discussion in Louisiana classrooms (Jankowski et al., 2017). Because these issues are prominent, it is especially relevant and important that Louisiana residents are educated on them. If LATA members are including Louisiana-specific issues in their EE instruction, they are making learning more relevant to students by connecting instruction to students' sense of place (Athman & Monroe, 2001). This type of instruction is more beneficial to learners and will typically encourage environmental literacy more effectively than other types of EE instruction (Kudryavtsev et al., 2012). Educators who believe in the content they are delivering, are comfortable with the material, and demonstrate passion over the subject matter tend to ignite more positive learner outcomes (Finn et al., 2009; Russell, 2000; Stern et al, 2013).

Aside from an increase in environmental knowledge, research suggests that EE provides numerous benefits for learners (Ernst, 2007; Stern et al., 2014). Athman and Monroe (2001) found that EE programs increased students' knowledge in multiple areas, including (a) natural sciences, (b) language arts, (c) mathematics, and (d) social sciences and help improve standardized test scores and grade averages. Effective EE encourages students to synthesize

knowledge and skills from multiple disciplines to process and solve problems and make decisions that lead to responsible actions, which contributes to developing their critical thinking skills (Ernst & Monroe, 2006). According to previous research, effective EE is beneficial to learners across several disciplines and improves their ability to make informed decisions outside of school (Athman & Monroe, 2001). Unfortunately, the results of this study suggest that LATA members are not incorporating EE into their curriculum on a regular basis despite their agreement that it is beneficial for their students. However, many of these individuals are likely incorporating EE topics actively into their curriculum but do not consider it to be EE instruction. The possibility of conflicting perceptions regarding the definition of EE and what it should entail calls for further research.

Recommendations for Research

The results of this study suggest that there may be conflicting perceptions on the definition of EE. These individuals may perceive EE to be associated with groups outside of the agricultural industry and therefore not relevant to their curriculum. Alternatively, LATA members may consider topics covered in EE to overlap with agricultural education but do not define EE as it was in this study. Therefore, a future study should be conducted with LATA members regarding their definition of EE. This will aid in understanding LATA members' perceptions and assist in furthering the integration of EE into agricultural instruction.

Further research should be conducted with Louisiana high school agriculture teachers who do not implement EE at all into their curriculum regarding their perceived barriers to implementation and their intention to implement EE in the future. When comparing perceived barriers to implementation of respondents who do not incorporate and those who do incorporate EE, there was only moderate overlap in reported barriers. The results of this study warrant a

deeper investigation on understanding teachers' intention to implement EE in the future, specifically on what influences their intention levels and the obstacles they face.

More research should also be conducted on the topics covered in Louisiana high school agriculture teachers EE instruction. Of those who reported their major influences to incorporate EE, most indicated that the relationship between agriculture and the environment was their largest influence. It would be valuable to understand to what extent agriculture teachers in Louisiana are teaching about this connection and to understand students' perceptions on these topics. Because EE topics and instruction are most appropriately incorporated into science and agriculture curriculums, more research should be conducted in these settings. This is especially true for Louisiana, where there remains little to no literature regarding EE implementation in science or agriculture classrooms in Louisiana prior to this study. Therefore, similar research should also be conducted with high school science teachers to further understand the implementation of EE in Louisiana.

Recommendations for Practice

Based on the results of this study, the researcher has numerous recommendations for future practice regarding agricultural education and the implementation of EE. Respondents indicated that they agree that EE is beneficial for their students, but the reportedly largest influence to incorporate EE into their curriculum was the relationship between the environment and agricultural practices. Another major influence to incorporate EE into their curriculum was their knowledge of soil erosion along Louisiana coastlines. In terms of instruction, the topics of environmental health, agricultural practices, and Louisiana's coastlines are intrinsically intertwined. Incorporating these topics into Louisiana classrooms may further motivate students to become environmentally literate because it is relevant to students' lives (Kim & Fortner,

2006). To further implement EE in Louisiana, these topics should be incorporated into professional development programs and discussed with agriculture teachers in Louisiana.

LATA members considered a lack of professional development opportunities and a lack of funding to be barriers in implementing EE into their classroom curriculum. More funding opportunities (i.e. grants and scholarships) should be made available to teachers who are interested in including EE in their classrooms. LATA members also stated that they do not have access to in-service staff development regarding EE implementation. Because different areas of Louisiana have different agricultural focuses and environmental concerns, area specific in-service staff development may be valuable to teachers. In-service staff development would provide a free and easily accessible source of professional development teachers within schools, which would aid in reducing numerous reported barriers to implementation. This would also provide an opportunity for teachers to learn about and include more localized topics of instruction to strengthen their EE implementation. If schools included in-service staff development, these professionals would also be able to assist science teachers in implementing EE into the science curriculum.

The researcher for this study encountered numerous obstacles attempting to reach high school science teachers in Louisiana. Since this population seems to be inaccessible, it is recommended that efforts be made to discover the most effective way to reach science teachers in Louisiana to disseminate information and improve science instruction when necessary in the state. If possible, a professional development organization with an accessible LIST-SERV specifically for science teachers in Louisiana should be developed.

APPENDIX A. Emails to Population Sample

December 12, 2018

Good morning,

I am writing you today to ask for your participation in a survey that Dr. Stair and I are conducting. This survey is being distributed to high school agricultural educators in Louisiana to discover if they implement environmental education, their perceptions of environmental education, the environmental education resources they have access to, and any perceived barriers to implementation.

Your response to this survey is very important and will help discover the status of environmental education in Louisiana and will contribute to the body of research on environmental education. This survey should take no more than ten minutes to complete. Please click the following link to access the survey (or copy and paste it into your Internet browser).

http://lsu.qualtrics.com/jfe/form/SV_6DVWnPmxOazFTxP

Your participation in this survey is voluntary and all of your responses will be kept strictly anonymous. Your responses will not be tied back to you or your school. If you have any questions or concerns about the survey, feel free to email me at osoler1@lsu.edu.
We appreciate your time and consideration in completing this survey. Thank you for your participation and your work for Louisiana high schools!

December 19, 2018

Good afternoon,

I hope everyone is doing well and is ready for the holidays! Last week you received an email from me and Dr. Stair asking you to participate in a survey on agricultural educators use of environmental education in Louisiana high schools. Your responses to this survey are important and will help us assess the status of environmental education in Louisiana. Whether you implement an entire unit or do not incorporate environmental education at all, your responses to this survey are valuable.

The survey should take only about 10 minutes to complete and there will be a chance for you to enter in a random drawing for an Amazon.com gift card after completion. If you have not already completed the survey, please click the following link or paste it into your web browser to access it.

http://lsu.qualtrics.com/jfe/form/SV_6DVWnPmxOazFTxP

Your time and effort are greatly appreciated! Thank you for your help in completing this survey and your work for high school education.

December 28, 2018

Good morning,

The holidays are a busy time for us all and we understand how valuable your time is. Dr. Stair and I are hoping that you can spare a few minutes to complete a survey about environmental education in Louisiana high schools. Your response to this survey, even if you do not implement environmental education, will help determine the status of environmental education in Louisiana.

If you have already completed the survey, your response is greatly appreciated. If you have not yet responded, we ask that you complete the survey. It will only take approximately 10 minutes to complete and there will be a chance for you to enter for an Amazon.com gift card after completion.

Please click the following link or copy and paste it into your internet browser to access the survey.

http://lsu.qualtrics.com/jfe/form/SV_6DVWnPmxOazFTxP

Thank you again for your time and efforts! I hope you have had a safe and wonderful holiday season.

January 1, 2019

Good afternoon,

I hope everyone is having a pleasant start to the new year! Recently Dr. Stair and I have asked you to complete a survey about environmental education in Louisiana high schools. We are hoping you can take about 10-15 minutes to complete the survey. It is being distributed to high school agricultural educators in Louisiana to discover if they implement environmental education, their perceptions of environmental education, the environmental education resources they have access to, and any perceived barriers to implementation.

There will be an opportunity for you to enter for a chance to win an Amazon.com gift card after completion.

If you have already completed the survey, we really appreciate your participation! If you have not responded yet, please click the following link or copy and paste it into your internet browser to access the survey.

http://lsu.qualtrics.com/jfe/form/SV_6DVWnPmxOazFTxP

Thank you in advance for your response. Your response is important and we appreciate your time and effort!

January 8, 2019

Good morning,

With school back in session, I understand that your spare time is very valuable and limited. Dr. Stair and I are hoping that you can spare a few minutes to complete our survey on environmental education. Your response will help determine the status of environmental education in Louisiana high schools.

If you have already completed the survey, we appreciate your time and participation! If you have not responded yet, please take 10-15 minutes to complete the survey by clicking the following link (or copy and paste it into your internet browser).

http://lsu.qualtrics.com/jfe/form/SV_6DVWnPmxOazFTxP

After completion, you will be able to enter in a drawing for a $25 Amazon.com gift card. This will be our final reminder email, so there is limited time to complete the survey and enter for the drawing.

Thank you in advance! We greatly appreciate your participation in our survey and everything you do for high school agricultural education.

APPENDIX B. IRB Approval Forms

ACTION ON EXEMPTION APPROVAL REQUEST

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu
lsu.edu/research

TO: Kristin Stair
Ag. and Ext. Education and Evaluation

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: July 30, 2018

RE: **IRB#** E11133

TITLE: Environmental Education in Louisiana High Schools

New Protocol/Modification/Continuation: New Protocol

Review Date: 7/27/2018

Approved X **Disapproved**

Approval Date: 7/30/2018 **Approval Expiration Date:** 7/29/2021

Exemption Category/Paragraph: 2a, b

Signed Consent Waived?: Yes

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable):

Protocol Matches Scope of Work in Grant proposal: (if applicable)

By: Dennis Landin, Chairman

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc. Approvals will automatically be closed by the IRB on the expiration date unless the PI requests a continuation.**

* *All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

ACTION ON EXEMPTION APPROVAL REQUEST

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu
lsu.edu/research

TO: Kristin Stair
Ag. and Ext. Education and Evaluation

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: September 24, 2018

RE: **IRB#** E11133

TITLE: Environmental Education in Louisiana High Schools

New Protocol/Modification/Continuation: Modification

Brief Modification Description: Asking conference participants to complete the study voluntarily at two different conferences rather than targeting specific schools and going through their school emails. Paper surveys will also be used instead of electronic.

Review date: 9/24/2018

Approved X **Disapproved** _____

Approval Date: 9/24/2018 **Approval Expiration Date:** 7/29/2021

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable):

By: Dennis Landin, Chairman DLandin

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: Make sure you use bcc when emailing more than one recipient. Approvals will automatically be closed by the IRB on the expiration date unless the PI requests a continuation.**

**All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

APPENDIX C. Survey Instrument

Consent to study

The purpose of this questionnaire is to obtain information from agriculture teachers in Louisiana high schools. This questionnaire is designed to discover if you implement environmental education into your curriculum, your perceptions on environmental education, the environmental education resources you have access to, and perceived barriers to implementation.

Your participation in this study is strictly voluntary and greatly appreciated. This information will be used to assess environmental education in Louisiana high schools. However, you are not required to participate in this study. It is strictly voluntary. Should you decide to participate in this study, please complete the survey in full. It will take approximately 10 minutes to complete. There are no more than minimal risks associated with this research study. There is no penalty for not participating, and there will be no compensation for your participation.

For any general questions concerning this research study, please contact Olivia Soler via email at: osoler1@lsu.edu or Dr. Kristin Stair via email at: kstair@lsu.edu. If you have questions about subjects' rights or other concerns, you may contact Robert C. Mathews, LSU Institutional Review Board, at (225) 578-8692, irb@lsu.edu, or www.lsu.edu/irb. Thank you, again. Your time is very much appreciated and we appreciate what you do for high school education!

Yes, I will participate.

No, I will not participate.

Definitions of Terms

Please read the following terms. They will be used throughout the survey.

- Environmental education – an educational process aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution; primary emphasis is on fostering environmental literacy

- Includes topics such as: ecology, forestry, evolution, geology, plants, wildlife, hydrology, natural resource management, biospheres/climate, entomology, sustainability, pollution, fisheries, aquaculture, waste management, agriculture

- Environmental literacy – The capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems
    - An environmentally literate individual can critically evaluate environmental issues, understand how to tackle those issues, and will make informed decisions to improve the well-being of their community, societies, and the global environment

Which of the following best describes your teaching? Please choose one.

I do not incorporate environmental education at all into my curriculum

I teach 1-2 class periods that include environmental education

I teach an entire unit on environmental education

I teach an entire course dedicated to environmental education

I use environmental education as a theme for the majority of my teaching

Please indicate which of the following items are reasons why you have not incorporated environmental education into your classroom. Select all that apply.

- Environmental education is not beneficial for students
- Lack of interest in incorporating environmental education
- Lack of environmental content knowledge
- Lack of pedagogical knowledge
- Grade level currently teaching
- The subject area currently teaching
- Emphasis on state standards
- Emphasis on state testing
- Lack of funding
- Lack of administrative support
- Lack of planning time
- Lack of transportation
- Lack of natural area to study
- Lack of community interest/community partners
- Lack of support from parents
- Lack of comfort being in the outdoors
- Counter to school climate
- Concerns regarding classroom management when outside of the classroom
- Lack of access to environmental education teaching materials
- Other:

Please indicate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I will implement environmental education into my classroom curriculum	○	○	○	○
I intend to implement environmental education into my classroom curriculum	○	○	○	○
I expect to implement environmental education into my classroom curriculum	○	○	○	○
I plan to implement environmental education into my classroom curriculum	○	○	○	○
I will try to implement environmental education into my classroom curriculum	○	○	○	○

Which best describes the school where you currently teach? Select all that apply.

Public

Private

Charter

Magnet

For-Profit

Themed/Immersion

Other:

Which best describes the setting of your school? Choose one.

Urbanized area (Area with 50,000 or more people)

Urban cluster (Area with 2,500-50,000 people)

Rural (Area with less than 2,500 people)

What grade level do you currently teach? Select all that apply.

9 10 11 12

What subject areas do you currently teach? Select all that apply.

Agriculture Biology Chemistry Environmental Science Other:

Please indicate how many years you have completed teaching in a classroom (in any subject)

Is your teaching approach/program associated with a training or professional development program that encourages environmental education?

Yes

No

If yes, what is the name of the program? Are you the coordinator of this program for your school?

Yes, I am the coordinator. The program name is:

No, I am not the coordinator. The program name is:

Is your teaching approach/program associated with a state or national program that encourages environmental education?

Yes

No

If yes, what is the name of the program? Are you the coordinator of this program for your school?

Yes, I am the coordinator. The program name is:

No, I am not the coordinator. The program name is:

Do you have any of the following teacher certifications?

I do not have a teacher certification

Traditional

Agriculture

Biology

Chemistry

Environmental Science

Environmental Science

General Science

Mathematics

Physics

Other:

When you teach environmental education, which topics do you teach? Select all that apply.

- Ecology
- Agriculture
- Geology
- Hydrology
- Entomology
- Forestry
- Evolution
- Horticulture
- Wildlife
- Silviculture
- Biospheres/climate
- Natural Resource Management
- Pollution
- Aquaculture
- Fisheries
- Green Energy
- Sustainability
- Other:

What influenced you the most to incorporate environmental education into your classroom curriculum?

Rank the extent in which the following resources are available to assist you to incorporate environmental education in your curriculum

	Have not used	Unavailable		Rarely available	Sometimes available	Readily available
Environmental education teaching materials		○	○	○	○	○
A mentor or coach (another teacher) who uses environmental education		○	○	○	○	○
In-service staff development in environmental science/ecology		○	○	○	○	○
In-service staff development in environmental education instructional strategies or materials		○	○	○	○	○
In-service staff development in using the environment as an integrating context for integrating subject areas and a source of real world projects		○	○	○	○	○
In-service staff development in comprehensive school reform strategies		○	○	○	○	○
Administrative support		○	○	○	○	○
Funding to support environmental education in my classroom		○	○	○	○	○
Transportation for traveling to field/study sites		○	○	○	○	○
A program coordinator at my school to assist with implementation		○	○	○	○	○
Professional development programs and educator resources such as						

- Project Learning Tree
- Project WET
- Project WILD
- Louisiana

Environmental Education Association (State affiliate to the North American Association for Environmental Education)	○	○	○	○	○
• Other					
Other:	○	○	○	○	○

Rank the extent in which you receive support from the following groups regarding implementing environmental education

	Does not apply	Fully oppose	No support	Very little support	Some support	Fully supportive
Administration in my school	○	○	○	○	○	○
School board	○	○	○	○	○	○
Other teachers in my school	○	○	○	○	○	○
Parents	○	○	○	○	○	○
Students	○	○	○	○	○	○
Community partners Other:	○	○	○	○	○	○
	○	○	○	○	○	○
	○	○	○	○	○	○

Rank the extent to which the following items presented difficulties in your implementation of environmental education into your classroom. For each item, check the box corresponding with the best description of your situation.

	Very strong obstacle/almost prevented implementation	Strong obstacle	Somewhat of an obstacle	Minor obstacle	Not an obstacle
Lack of training or professional development opportunities	○	○	○	○	○
Lack of environmental content knowledge	○	○	○	○	○
Lack of procedural/pedagogical knowledge	○	○	○	○	○
The grade level I teach	○	○	○	○	○
The subject area I teach	○	○	○	○	○
	○	○	○	○	○
Emphasis on state standards	○	○	○	○	○
Emphasis on state testing	○	○	○	○	○
Lack of funding	○	○	○	○	○
Lack of administrative support	○	○	○	○	○
Lack of planning time	○	○	○	○	○
Lack of transportation	○	○	○	○	○
Lack of natural area to study	○	○	○	○	○
Lack of community interests/community partners	○	○	○	○	○
Lack of support from parents	○	○	○	○	○
Lack of comfort being in the outdoors	○	○	○	○	○
Counter to school climate	○	○	○	○	○
Concerns regarding safety, liability, and classroom management	○	○	○	○	○

when outside the classroom

Lack of access to environmental education materials Other: ○ ○ ○ ○ ○ teaching

○ ○ ○ ○ ○

Rank the extent in which you perceive the following items to be results of environmental education

	Strongly disagree	Disagree	Agree	Strongly agree
Students have improved academic achievement in other subject areas	○	○	○	○
Students have improved classroom behavior	○	○	○	○
Students have improved environmental literacy	○	○	○	○
Students have improved critical thinking skills	○	○	○	○
Students have improved problem solving skills	○	○	○	○
Students have increased interest in the environment Other:	○	○	○	○
	○	○	○	○

Demographics

Which best describes the school where you currently teach? Select all that apply.

Public

Private

Charter

Magnet

For-Profit

Themed/Immersion

Other:

Which best describes the setting of your school? Choose one.

Urbanized area (Area with 50,000 or more people)

Urban cluster (Area with 2,500-50,000 people)

Rural (Area with less than 2,500 people)

What grade level do you currently teach? Select all that apply.

9 10 11 12

What subject areas do you currently teach? Select all that apply.

Agriculture Biology Chemistry Environmental Science Other:

Please indicate how many years you have completed teaching in a classroom (in any subject)

Please indicate how many years you have incorporated environmental education

Is your teaching approach/program associated with a training or professional development program that encourages environmental education?

Yes

No

If yes, what is the name of the program? Are you the coordinator of this program for your school?

Yes, I am the coordinator. The program name is:

No, I am not the coordinator. The program name is:

Is your teaching approach/program associated with a state or national program that encourages environmental education?

Yes

No

If yes, what is the name of the program? Are you the coordinator of this program for your school?

Yes, I am the coordinator. The program name is:

No, I am not the coordinator. The program name is:

Which of the following characteristics describes your environmental education program/curriculum? Please select all that apply.

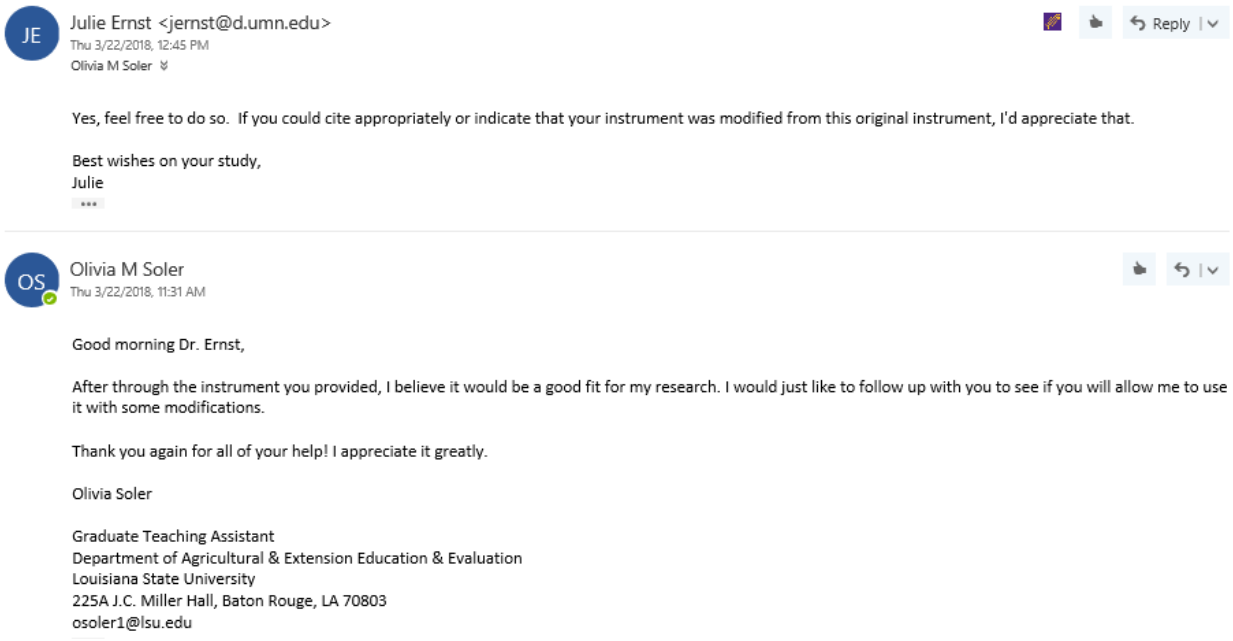
- I do not use environmental education
- Interdisciplinary (integration of multiple subject areas/disciplines)
- Focus on the natural environment
- Focus on the socio-cultural environment
- Project-, problem-, or issue-based learning experiences
- Service-learning experiences
- Learner-centered instruction
- Constructivist approaches
- Team-teaching
- Cooperative learning
- Other:

Do you have any of the following teacher certifications?

- I do not have a teacher certification
- Traditional
- Agriculture
- Biology
- Chemistry
- Earth Science
- Environmental Science
- General Science
- Mathematics
- Physics
- Other:

If you would like to be entered in a drawing for one of three $25 Amazon eGift cards, please send your name and email address to osoler1@lsu.edu. Please type "amazon gift card" into the subject line of the email.

APPENDIX D. Permissions



JE

Julie Ernst <jernst@d.umn.edu>

Thu 3/22/2018, 12:45 PM

Olivia M Soler

Reply

Yes, feel free to do so. If you could cite appropriately or indicate that your instrument was modified from this original instrument, I'd appreciate that.

Best wishes on your study,
Julie

OS

Olivia M Soler

Thu 3/22/2018, 11:31 AM

Good morning Dr. Ernst,

After through the instrument you provided, I believe it would be a good fit for my research. I would just like to follow up with you to see if you will allow me to use it with some modifications.

Thank you again for all of your help! I appreciate it greatly.

Olivia Soler

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